CLAPP'S FAVORITE PEAR.

[See page 266.]

EIGHTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

MAINE BOARD OF AGRICULTURE.

1863.

AUGUSTA:
STEVENS & SAYWARD, PRINTERS TO THE STATE.
1863.

BOARD OF AGRICULTURE...1863.

SAMUEL F. PERLEY, President.
SAMUEL WASSON, Vice President.
S. L. GOODALE, Secretary.

NAME.	COUNTY.	P. O. ADDRESS.
	Term expires January, 1864.	
S. F. Perley,	Cumberland,	Naples.
George A. Rogers,	Sagadahoc,	Topsham.
Ellis Fish,	Somerset,	Hartland.
Farnum Jewett,	Oxford,	North Waterford.
S. L. Goodale,	York,	Saco.
	Term expires January, 1865.	
J. C. Weston,	Penobscot,	Bangor.
Samuel Wasson,	Hancock,	Ellsworth.
Seward Dill,	Franklin,	Phillips.
J. W. Haines,	Aroostook,	Maple Grove.
Lyman Lee,	Piscataquis,	Foxcroft.
W. R. Waterman,	Washington,	Robbinston.
	Term expires January, 1866.	
Calvin Chamberlain,	Maine State Society,	Foxcroft.
Joseph Percival,	Kennebec,	Waterville.
Cyrus M. Pratt,	Androscoggin,	Greene Corner.
Sumner Leach,	Lincoln,	Warren.
——— ———,	Waldo,	———.

REPORT.

To the Senate and House of Representatives:

The Board of Agriculture convened at the State House in Augusta, January 21, 1863, in accordance with the provisions of law, and was called to order by the Secretary.

Messrs. Dill, Fish and Rogers were appointed a Committee on Credentials, who reported a quorum present. Permanent organization was then effected by the unanimous election of

Samuel F. Perley, *President.*
Samuel Wasson, *Vice President.*
S. L. Goodale, *Secretary.*

Messrs. Weston, Chamberlain and Wasson were appointed a Business Committee to report subjects for the consideration of the Board.

Pending the Report of this Committee, several reports were presented upon subjects investigated during the interim since the last session of the Board.

Mr. Rogers offered the following Report upon

Experiments in Potato Culture.

The Committee appointed to collect, compare and report upon the results of the experiments proposed by the Board at its last session, with reference to ascertaining the distance at which potatoes should be planted to secure the best results, have attended to that duty and report:

They have been able to collect the result of but eighteen experiments, conducted by eleven different individuals, in various sections of the State. These came in so varied forms, that, although each indicated the result of the experiment, it was found impossible to arrange them in a compact table. In almost every instance we have found that the closer planting produced the greater yield, though there were exceptions to this general result.

After having carefully examined and compared the returns of the several experiments, your Committee find that, although the close planting produced the greatest amount, yet the result indicated to us that the increased yield *did not* compensate for the extra seed and increased amount of labor required in cultivation.

The conclusion arrived at by your Committee is, that the returns indicate that two feet by three, produces a better result of crop, all things considered, than a greater or less distance; yet this should be varied somewhat, by the variety of potato intended to be grown.

A few of the experiments, although they may not coincide exactly with the conclusions arrived at by your Committee, were nevertheless so carefully conducted, and so faithfully and clearly reported, that we deem them worthy of being returned to this Board in connection with this report. We would call attention particularly to those conducted by Calvin Chamberlain of Foxcroft, and William D. Dana of North Perry.

Experiment by C. Chamberlain, Foxcroft.

The variety of potato planted, is known as the Orono or Reed. The planting was on May 9th. The land was in tough sod, and plowed in October, 1861. It had been mowed ten years, and in that time had received one slight top-dressing of phosphate of lime, and one of ashes. It had become much exhausted. The soil is a slate loam, dry and stony. The spring culture was simply harrowing. The rows were marked by drawing a chain. One peck of fish guano was scattered evenly in each row; the seed, one piece in each hill, was dropped on the surface and slightly covered. No rain fell after the planting, till June 18th. On account of the drought the hoeing and hilling was done soon after the most advanced tops appeared. The dressing was calculated at the rate of twenty-seven and a half bushels per acre, at a cost of $19.25. We state thus particularly for the purpose of showing the result of the application of a fertilizer not much known, except immediately on the coast. The potatoes produced in this experiment are of excellent quality—good and sound at this date (January.) Those marked *refuse* in the table, were the small ones, together with an occasional one of the largest size having discolored spots, showing disease. Less than eight per cent. of result is in this column.

The amount of seed per acre was found by the count of one bushel.

Number of hills.	Weight of good potatoes.	Refuse potatoes.	Total weight.	Bushels seed per acre.	Bushels yield per acre.	Missing hills.
245	258	25	283	22½	259½	19
171	219	18	237	15	217¼	5
132	227	14	241	11½	221	–
87	183	12	195	7½	178¾	1
248	213	9	222	–	203½	16
166	238	15	253	–	232	10
131	178	6	184	–	168¾	1
88	197	13	210	–	192½	–
243	182	27	209	–	191½	21
172	216	16	232	–	212¾	4
157	217	14	231	–	211¾	19
132	196	14	210	–	192½	–
248	198	16	214	–	196⅕	16
176	175	13	188	–	172½	–
124	174	13½	187½	–	172	8
87	136	12½	148½	–	136	1

Each of these lines of figures is the result of two rows forty-four yards long, each, or one-fifty-fifth of an acre.

In the third experiment an error in planting occurred, by which the one and a half foot distance was repeated, and the three feet distance left out.

Taking the averge of results, and we have—

Distance.	Bushels seed per acre.	Yield per acre.
1 foot	22½ bushels	213 bushels.
1½ "	15 "	209 "
2 "	11¼ "	188 "
3 "	7½ "	169 "

Deduction. The above table shows that seven and a half bushels planted at three feet distance produced one hundred and sixty-nine bushels, or over twenty-two and a half from one—that increasing the quantity of seed by three and three-fourths bushels, planting at two feet distance, gives an increase of nineteen bushels, or five and one-fifteenth bushels to each bushel of additional seed; that a further addition of three and three-fourths bushels seed—planting at one and a half feet gives a result of twenty-one bushels, or five and two-fifths for one. Lastly, increasing the seed by seven and a half bushels, giving a distance of one foot, and it results in an increase of only four bushels, or eight fifteenths of a bushel to one of seed. Comparing the one and a half feet with the three feet, and we have forty eight bushels more per acre with fifteen bushels of seed than with seven and a half bushels at three feet. The number of hills is given in the table, as found at harvest, because of there being many missing ones from drought and other causes. In the three experiments with the three feet distance, we have only two missing hills; in the four at two feet, nine missing; in the five at one a half feet, thirty-eight; and in the four at one foot, seventy-two.

Only one thing seems to be well settled by the above—that to plant this variety of potato with the above quantity of seed, at a less distance than one and a half feet is on the wrong side of correct practice.

Experiment made at North Perry, by William D. Dana, Esq., at the suggestion of the Board of Agriculture.

	Distance of hills in the row, feet.	Quantity of seed per acre in bus. of 60 lbs. each.	Yield per acre of large sound potatoes.	Yield per acre of refuse and few diseased ones.
1st. Experiment having reference only to distance, the quantity of seed being the same in each hill. Extra large or No. 1 potatoes (two to the pound) cut one eye in each piece, and one piece planted in hill,	1	25	450	50
	1½	17	250	15
	2	12½	188	37
	3	8	217	16
2d. No. 2 size seed, eight to the pound, planted as above, cut in four pieces, and one piece planted in each hill,	1	10	320	60
	2	5	230	30
3d. No. 2 potatoes cut in two pieces, one piece in a hill,	1	19	374	58
No. 2 potatoes cut in two pieces, two pieces in a hill,	2	19	319	45
No. 2 potatoes cut in two pieces, three pieces in a hill,	3	29	235	50
4th. No. 3 potatoes, seventeen to the pound, cut in two pieces, one piece in a hill,	1	11	277	39
No. 3 cut in two pieces, two pieces in a hill,	2	11	220	45
No. 3 cut in two pieces, three pieces in a hill,	3	11	189	33
5th. No. 2 planted whole, one in each hill,	1	37½	446	58
No. 2 planted whole, one in each hill,	1½	25	376	36
No. 2 planted whole, one in each hill,	2	19	308	30
No. 2 planted whole, one in each hill,	3	12½	237	27
6th. No. 3, seventeen to the pound, planted whole, one in each hill,	1	18	278	48
No. 3 planted whole, one in each hill,	1½	12	234	41
No. 3 planted whole, one in each hill,	2	9	227	25
No. 3 planted whole, one in each hill,	3	6	166	20

The variety of potato experimented with, is a rank and late grower, not given to rot—the tops being about four feet average length, and green and growing when dug, October 10, 1862. The manure was spread upon the ground and plowed and harrowed in. The rows at two and a half feet apart.

A remarkable degree of regularity will be noticed in these results, with the exception of the first lot, and they show, so far as they show anything—1st, that one foot by two and a half is better than any greater distance. 2d, that whole seed of medium size is better than cut. 3d, that the larger the seed, the larger the crop—all of which, with the exception of the last, agrees with my experience for thirty years past. In regard to the last point, in raising White Blue Nose potatoes, an early maturing and small foliaged variety, (the kind formerly cultivated almost exclusively here for market,) I never, in but one instance, could perceive that small seed was not equally as good as large. Perhaps the very different habits of the varieties may make the difference. The one growing with small amount of vines or tops, getting its full growth and ripening in September or August sometimes—the other growing a perfect swamp of tops, and never getting its growth or ripening—but withal a very good potato, and very free from rot. I have aimed at accuracy in this experiment—doing the work myself, and weighing the seed and crop, calling sixty pounds a bushel for convenience in reducing, one pound (1-60) bearing the same proportion to a bushel, that one hundred hills at three feet bear to an acre (1-60.)

North Perry, Oct. 11, 1862.

Some discussion having followed the reading of this report, on motion of Mr. Chamberlain, it was voted to continue the subject of potato culture as one of the topics for consideration during the interim. Messrs. Percival, Lee and Leach were appointed a Committee to report on this topic at the next session, and the following resolutions were introduced by Mr. Chamberlain:

Whereas, It is desirable that we should know more in regard to the best methods for the general culture of the potato, and whereas, the experience of past years has led to the cautious application of stable manure as a fertilizer for this important crop, thus inducing a practice of planting extensively for small returns, and whereas, it is important that we should learn at an early day the value of fish guano, and to what crops it may best be applied; therefore, *Resolved,* That we pledge ourselves, so far as circumstances may permit, to conduct an experiment the present year, in the culture of the potato, using fish guano as a manure, in accordance with such suggestions as may be furnished by the Committee of the Board.

Resolved, That a general invitation is hereby extended to farmers to join us in the experiment, with the request that results be returned to the Secretary of this Board.

Mr. Chamberlain presented the following Report on

Flax Culture.

The Committee appointed at the last meeting of the Board, to investigate the subject of Flax Husbandry, have attended to the duty assigned, to the extent of their limited opportunities, and Report:

That it gives them great pleasure to find that this topic, of vital national importance, has received merited attention at the hands of the Government, and that a competent gentleman has been sent to Europe to investigate the cultivation and manufacture of flax; and that the facts thus elicited, together, with the present home status of this interest, are assigned a prominent place in the Agricultural Report of the Commissioner of Patents for 1861. It might seem that this investigation, conducted with all the means at the command of the Government, would have sufficiently ventilated the subject, without an additional effort on the part of humble individuals laboring for the greatest good of a single State.

It appears from the report above named, that but little remains to be done, when, by the aid of machinery, flax may be expeditiously treated in its several mechanical and chemical manipulations, and converted to ultimate uses.

In pursuance of our mission, one of your Committee, during the year took occasion to visit the State of Rhode Island, where we had in some way received the impression that the greatest success had been attained in the manufacture of flax fabrics. Our journey, (a very hurried one,) accomplished nothing further than to put us in communcation with a "Committee appointed by the Rhode Island Society for the encouragement of Domestic Industry," to investigate the subject of Flax culture and its preparation and use in connection with cotton and otherwise.

A member of that Committee, (Hon. James Y. Smith,) communicates to us the result of a meeting holden at Providence, October 2d, 1862, and we take the liberty to make the following extract from his letter: "We have memorialized Congress upon the subject, and asked Congress to aid us by making an appropriation to procure certain machinery to produce the desired result. The Committee of Congress on Agriculture has the subject under consideration, and may report at the next session.

A meeting was held to-day, to discuss the subject of Flax production and its manufacture. About thirty gentlemen were present, with our Senator and Representative. The discussion was animated and full, but no definite conclusions arrived at.

I will answer your several questions:

1st. 'The farmers of Maine would like to be informed in regard to the probable price that flax straw may bear in market at tidewater.'

This question could not be answered satisfactorily.

2d. 'Is such product lessened in market value by being ripened so as to mature the seed?'

I think the crop would be required to be cut before the seed was in full glaze. The largest oil manufacturers say the seed will produce more oil in this state than with seed fully ripened.

3d. 'Must the crop be pulled and bundled, or may it be cut with a scythe or cradle?'

The crop may be cut or pulled, but must be kept in straight layers.

4th. 'May it be threshed and then baled, as hay for transportation?'

It could not be used if the stubble is required to be cut in certain lengths before being separated from the woody portion of the stubble, and the fibre exploded by chemicals or otherwise.*

I don't think your farmers would be warranted in making a change until further progress is made. The West has millions of tons of stubble lying to waste, but of no use for this experimenting. The crop must be grown and handled with care to be used successfully for the new process of manufacture. I think it will come to be successfully used, but time must develop the subject."

From the tone of the above communication, gentlemen of this Board will conclude that we are not quite so near the *beginning of*

* We have been accustomed to use the word *stubble* as meaning that portion of the straw or stalk below where it is severed by the harvesting implement. Our friend applies it otherwise.

the end of this matter as they flattered themselves a year since. If, with the millions at the command of the manufacturers of Rhode Island they are at the present date besetting the halls of Congress for an appropriation "to procure certain machinery," we need no assurance that progress will not be rapid so far as it is open to the public.

However desirable it may be, as times have changed—to bring the flax culture back upon our farms, if its return is to be made dependent on the restoration of the domestic habits and primitive customs—the round of toil to which our mothers were subjected (God bless them,) then the people of Maine will never vote it back. But when manufacturers ask for flax, the farmers of this as well as the other free States, will listen to them.

It would take a great breadth from our bread-producing acres, to yield so much flax seed as to supply our wants for paint-oil and cake for feeding purposes. But the flax crop is so natural to our soil and climate, that a change would be extensively made if a demand should arise for flax straw. We might as well be dependent on other States for a little more flour and corn as to be constantly buying every gallon of drying oils that we use.

Your Committee as at present advised, see no reason that the Board should change its position on this topic, from that assumed at the last session; and that the words of a resolution passed by the Board, January 27th, 1862, still remain as the best expression that we have to offer to the farmers of Maine.

The resolution referred to is in these words:

Resolved, That we invoke the aid of manufacturers, with the capital and skill at their command, in placing our State in a condition less dependent on foreign aid in regard to clothing; and when they shall be prepared to pay remunerating prices for flax in the straw state, we pledge them that the soil of Maine and its cultivators will generously respond to the demand.

Mr. Haines offered the following paper on

The Value of Pedigree.

I assume that the Board clearly recognizes the value of purity of blood in all efforts to improve our live stock and that in requiring a report on the value of a recorded pedigree, the design is merely to show how this is reliable evidence of the desired purity of blood in the animal possessing it.

If it were necessary for me to urge upon the Board the value of pure blood in our breeding stock, I might cite many remarkable instances to demonstrate it, as I have had no little experience in the breeding of animals, particularly of neat stock, and I have had it forced upon my observation repeatedly, that the longer animals are bred in one line, and the purer their blood, the stronger and more surely do they mark their offspring; and I cannot refrain here citing as an example, the short-horn bull Leopard 2d, which originated in the celebrated Bates stock, because he was so widely known and had so much to do with establishing the character of neat stock in the Kennebec valley. He was a most notable instance of the value of fixed properties in a sire, the evidence of which I first obtained, when I bought him of E. P. Prentice, of Albany, N. Y., in a written pedigree tracing his descent entirely through pure-bred animals, and which was afterwards proved to the satisfaction of all who sought his service with their cows, by the unerring certainty with which he marked his get.

According to the dictionaries, a pedigree is *an account or register of a line of ancestors*; but to a breeder of live stock it has a wider significance. It here signifies that the animal possessing it has a record of a line of ancestors, who have been religiously kept in one race or breed, tracing their descent from unquestionable stock of the same character. By it, as Mr. Goodale says, in the introduction to his valuable book on the breeding of domestic animals, "satisfactory evidence is offered that the animal is of a pure and distinct breed, that it possesses certain well-known hereditary qualities." Finally it means to the live stock breeder a paper by the examination of which the absolute purity of breeding in the named animal may be made positively clear and undisputable.

It is the great safeguard which the purchaser may have against fraud. He has not to rely solely upon the word of the breeder; and if one should be so dishonorable as to attempt to deceive and cheat by palming off a fictitious pedigree with his animals, he must so "lie with circumstances of times, places and persons," that, by reference to the very authorities quoted, he may be readily detected.

To be complete, a pedigree must exhibit the breed and name of the animal, the date of its birth, the breeder's name and that of the present owner, the names of the sire and dam and their progenitor on both sides, back to herd-book numbers or to herds or flocks of acknowledged purity of blood, or well established studs, in every individual branch or root of the family tree; and this is what every reliable breeder in the country expects and is as much prepared to do as he is to furnish the animal which he has bred for sale.

If a man buys an animal as pure bred, and does not require therewith a written pedigree, full and complete, he must always be in doubt about its purity of blood and breeding, and in selling again, either the animal itself or its progeny, he must convey the same doubt and thus leave a door always open to dishonest practice, at the same time lending to it the advantage his name may give.

Herd books of the short horns and Devons have now been so long established that purchasers in either of these breeds may fairly *demand* that their selections shall trace directly on both sides to a record therein. And no breeder of live stock of *any* sort has a right to sell as "pure blood" any animal of which he cannot furnish a full and complete pedigree, tracing back in unbroken line to well established herds of unquestionable character. Purchasers should always demand this and failing to obtain it, ought, for their own sake, and that of honest and unreliable dealers, to forego the proposed purchase, however highly they may esteem the selected animal; for there are now throughout the country, honest and careful men who are struggling on in the straight and narrow way against a very unfair competition, and for their extreme care and exactness in the observance of rules and unwillingness to admit any but most thoroughly bred stock in their herds and flocks, are constantly subjected to the slanderous abuse and would-be witty flings of ignorant and unscrupulous dealers and breeders. I have heard breeders insinuatingly remark upon the herds of others that they did not care to own cattle of such aristocratic blood as required a pedigree; that they preferred good animals on their own hoofs, to having them good on paper; that they did not need a written history to inform them about the purity of an animal's blood, if they could but put their two eyes upon the animal, &c., &c.; and the reflection which I made was, that they were either very ignorant, or that they believed their audience to be so, and were themselves unscrupulous and unfair. Every purchase of an assumed "pure bred" animal which has not a written proof of its just claim to the title, is but an encouragement to the dishonest, and one more obstacle in the way of the honest breeder.

If an animal be bought for breeding purposes, a full and complete pedigree is as essential as a warranty of soundness, and should be no more neglected.

Mr. Perley presented the following paper on

Winter Care of Stock.

The leading object of this paper is to call the attention of farmers to and demonstrate the necessity of more abundant food and better care of their herds and flocks.

If a store animal receives food barely sufficient to maintain its weight, without gain or loss, it is manifest that the owner is losing daily just the worth of the food consumed and the labor of tending, deducting the value of its excrements. If the same animal diminishes in weight, the loss is the full sum of the worth of food consumed, the labor of tending and the pounds of diminution at its current value in the market, minus the value of its excrements. To make an actual profit the animal must increase in weight so that the pounds of gain, together with the excrements, shall be worth more than enough, at current values, to pay for all the food and the labor of tending; and the surplus so obtained is the actual profit. With milch cows, working horses and oxen, and breeding sheep, the case is different; they may yield their owner a profit in other ways, as in milk, labor or wool; but with all growing stock the facts are as above stated. The profit on the milch cow is the surplus value of her dairy products, increased by the value of her excrement, over and above the value of her food, and the labor of tending and manufacturing the milk into butter or cheese. The profit of the full grown ox or horse is the surplus value of his labor and excrements over and above the value of his food and labor of tending. And the profit of the sheep is the surplus value of its wool, excrements and lambs raised, over and above the worth of food and labor of tending.

Now if the above positions are correct, the farmer who allows his young stock to remain stationary at any season of the year, to "just hold their own," as he terms it, is actually losing the full value of the food consumed and the labor of tending, less the value of the manure. The milch cow which barely pays the expense of keeping and care, is a "dead head," yielding no profit. So of the ox, the horse or sheep. To make stock keeping in any of its departments profitable, each animal must return an income over and above its cost, else the farmer is simply changing the form of his product without increasing its value. There are some animals, ill bred brutes, which can never be made to yield a profit; such should be at once laid out for fox-bait, or, better still, incorporated in the compost pile, so that, being dead, they may be turned to some good account, for, while living, they make the farmer poorer every day. There are thousands of others which might, but do not yield a profit, and the fault that they do not, is entirely with their owners. A "plentiful lack" of good care and food is the reason. There are comparatively few animals which do actually yield a profit, either in growth, in labor, in dairy products or wool; and these are always found in the hands of careful, good feeders. But the profitless animals, it is believed, greatly outnumber those yielding a profit; outnumber them to a far greater extent than farmers are generally willing to admit; and this is the result of short pastures in summer, cold barns and a scanty supply of good, nutritious food in winter. In a climate like that of Maine, it becomes necessary for the herdsman and flockmaster, if they would keep their stock in a continually thriving condition, to provide food, other than pasturage, for more than half the year. From December 1st to April 30th, the animals upon the farm must, ordinarily, receive all their living from the winter's store; and the necessity is scarcely less imperious during November and May. The scanty feed in the pastures in the latter part of summer and early autumn, caused by the drouth usually occurring at that period, renders it highly important that at this season, too, feed of some kind should be supplied, else the stock will come to the barn in ill condition. The farmer who would see his stock continually gaining, or yielding a profit, must be prepared to feed, more or less, two-thirds of the whole year. This may seem a strong statement to some, but let him who doubts it, place his animals upon the scales once in every thirty days for a twelve month, and he will be convinced of its correctness. Farmers who rely upon a guess judgment, are very apt to misjudge the condition of their stock. Only a few days ago, the writer heard an experienced, good farmer, and a good judge, make the statement that his young stock actually gained more during the winter of 1861 and 1862, than during the summer following, and this without provender of any kind, the hay being of a poor quality, having been cut upon low, wet land. One of two things must be inferred from this statement, viz., that the summer's

FOUR COTSWOLD EWE LAMBS.

Bred and owned by CHARLES CORLISS, of "Poplar Lawn," Haverhill, Mass. Exhibited at the "Essex Agricultural Society's Show," held in Georgetown, September 30 and October 1, 1862, and winners of the premium offered by the Society, for the best lot of Lambs.

gain was very small indeed, or that the farmer was mistaken in his judgment, most probably the latter. The writer has frequently called upon his herdsman to guess upon the gain or loss of individual animals since the former weighing, when again brought to the scales, and though the man—being a fair judge—had been with the animals every day, had constantly tended them and knew whether they had fed well or ill, yet he would as often guess very wild as near the mark. The girting chain is not a sure indicator of condition; often an animal, retaining well his girth, will show by the scales a gain or loss of twenty-five to fifty pounds in a period of a few days or weeks.

The degree of cold to which an animal is exposed has a very marked influence upon its condition, as may be shown by actual trial. For this purpose I desire to introduce some observations, (they hardly deserve to be called experiments,) made upon my own herd of neat stock during the past year. The herd consisted of twenty-three animals, viz: four oxen, working about half the time; eight cows, giving milk as indicated in the table; two heifers, two years old coming three; five yearlings, coming two; four calves, coming one.

I give below a page from my herd-book, containing a general summary, the result in gross of the food, total gain or loss per day, weight of milk per day, mean temperature and date of birth of calves. I embrace the whole neat stock upon the farm in these observations, for the reason that many farmers will say when questioned closely that they are aware that some of their animals are losing, but that others are doing well enough to make all up to a fair gain.

1861.	No. days between weighing.	Meal per day in quarts.	Roots per day in bushels and qts.	No. feeds per day Timothy or clover.	No. feeds per day meadow hay.	No. feeds per day corn stover.	Mean temperature.	Total gain, lbs.	Gain per day, lbs. and ozs.	Total loss.	Loss per day.	Weight of milk per day.	Birth of calves.
Nov. 30 to Dec. 14	14	14	6.0	1	2	2	31.3	474	36.8				
Dec. 14 to Dec. 30	16	20	6.4	1	2½	1½	24.1	191	12.0			40.7	
1862.													
Dec. 30 to Jan. 11	12	26	4.14	1½	1	2½	17.7	120	10.0			40.3	
Jan. 11 to Feb. 3	23	26	5.16	1½	2½	1	18.0	89	4.0			45.3	
Feb. 3 to Feb. 15	12	44	6.16	1½	2½	1	19.7	36	3.0			45.1	Feb. 8.
			Shorts										Change of herds
Feb. 15 to Mar. 3	16	53	1.5	1½	2½	1	22.5			32	2.0	62.14	-man one week.
Mar. 3 to Mar. 15	12	50	1.4	1	3	1	32.7	294	24.8			56.1	March 21.
Mar. 15 to Mar. 29	14	46	0.28	1	4		29.9	207	14.12			64.15	March 26.
Mar. 29 to Apr. 12	14	47	0.28	1	4		32.7			210	15.0	84.3	April 9.
Apr. 12 to Apr. 22	10	43	Pota's	2½	2½		46.5			383	38.5	84.3	April 17.
Apr. 22 to May 6	15	64	0.16	4			44.1	71	4.12			95.13	May 4.
May 6 to May 15	9	51	0.25	Grass.			54.2			93	10.5	104.11	
		Short pasturage with corn											Sept. 9—June 2.
May 15 to Nov. 26	195	fodder and pumpkins.						2011	10.5				Aug. 9--Nov. 26.

It will be perceived that from the first to the sixth weighing—i. e., from Nov. 30 to March 3, a period of ninety-two days, the forage feed continuing about the same, the grain feed being successively increased, while the mean temperature, (three observations each day,) fell from 31.3 to 17.07, and continued low for sixty days, there was a continual diminution in the gain of the stock, until, on the third of March, it became a positive loss. Then again the mean temperature rose to about 31 degrees, and for the next two weighings, a period of twenty-four days, carrying it to the 29th of March, there was a very fair gain.

After which time, the dropping and suckling of calves, the increased flow of milk and other irregularities, gave an irregular result, mostly a loss, although the temperature of April and May was favorable. Exact experiments can only be made under the personal care of an intelligent experimenter. Every circumstance and condition must be carefully noted and recorded. Too much reliance should not, therefore, be placed upon the foregoing observations, the feeding and care of the stock being all the while in the hands of another person. The results observed regarding temperature, however, accord so well with the generally received opinion that it cannot but strengthen that opinion, and lead farmers to provide warm shelter and an abundance of nutritious food for stock in severe weather. Animals, it is true, will eat enough food in very cold weather—they must do so or die, if this only is offered them; but they will not, cannot gain, or yield a profit upon such food. In the above trial, the stock was full-fed most largely upon corn-stover and meadow hay. It consumed, in addition, 200 bushels meal, one ton cotton seed, one ton shorts, and 500 bushels roots. With this food, and it is believed to have been more liberal than is allowed upon most farms, the total gain from Nov. 30 to May 15, was only 764 lbs. To this should be added the worth of milk, labor of oxen and excrements; yet with these additions, a balance sheet would show very much to the disadvantage of successful farming.

Next to exposure and positive suffering by cold and lack of food, irregular feeding, unkind treatment, and any other circumstances which create disquiet, are the causes of loss. No worrying of dogs, or ill-usage by thoughtless boys or ill-tempered men, should be allowed. Five minutes abuse while driving to or from the pasture,—while getting the animals to and confining them in their stalls during the operation of milking or currying, will probably cost the owner two-fold more than the labor of the man or boy, thus guilty, can be worth, and such herdsman or boy should be at once reformed or discharged from his place.

A constant supply of good water, easily accessible, and in a sheltered place for winter's use, is of the utmost importance to the health and consequent profit of farm stock. That from a spring or running brook is best; but this cannot always be obtained near at hand, and the practice of driving any considerable distance to water is always objectionable, particularly in severe weather. A well or cistern must often serve as a substitute for the running stream—from these the water should be freshly drawn and always free from offensive taste or smell. Many animals accustomed to pure water, will refuse that which is brackish or impure, until considerable suffering from thirst has been endured. This is a source of loss not generally appreciated by stock-owners.

These and several other points, scarcely less important, might be enlarged upon, but we will pursue it no further at present.

Now I hazard the assertion that not one herd in ten, take the State through—yes, I will say one herd in twenty—but leave the barn on the twentieth of May weighing less than when housed on the twentieth of November, and unless the excrements are reckoned higher than farmers generally value them, and unless the price of stock rules very much higher in spring than in the fall, all these nineteen out of twenty stock-owners have just thrown away their feed and labor, and with more courage than discretion are ready to engage in another hard summer's labor, that they may be able to do the same again. They find themselves in spring with the same number of animals, diminished in quality and gross weight, with a pile of manure, (that is, so much as has not been washed away to the neighboring stream,) in offset for the same animals in better condition the previous fall, and tons of hay or straw and bushels of meal and roots which those animals have consumed. There must be here a large balance upon the wrong side of the ledger, when the profit and loss is recorded.

Query. Would not the farmers of Maine act more wisely in keeping a less number of animals, feeding them more highly, and housing them more comfortably, thus securing a constant gain?

Mr. Waterman presented the following

On Rotation of Crops.

Among the many practical questions presenting themselves to the farmer for solution, there is probably not one ordinarily passed over more lightly, and, at the same time, of more importance, than the question of what crops he shall plant and sow from time to time. Very often it is settled by present convenience, chance, caprice, or perhaps more often by the way the farmer has become accustomed to do, without any fixed rule.

Experience has proved what might be very readily supposed, that the ordinary farm crops require to be changed round, or not cultivated for any great length of time, the same crop upon the same place.

To this there may be some few exceptions. Onions have been grown for a century upon the same spot, without diminution of the crop or deterioration of the soil. Carrots will admit of being grown quite a number of years successively upon the same spot. Buckwheat will sometimes produce better the second year than the first; oats and potatoes, in some cases, nearly as well. Grass may be raised for an indefinite length of time by top-dressing, and occasionally turning over the sod, manuring, harrowing, rolling and seeding down.

Now the demand which exists for a variety of products for home consumtion, and the uncertainty which attends all crops, seem to make it imperative to raise a variety of crops. Such being the case, we may, first, in deciding how the different crops shall be grown, inquire whether or not the same crop can profitably be raised upon the same ground for successive years—if so, it might be very much more convenient. The crops which involve in the process of cultivation and storing, a good deal of carting, might be grown convenient to the farm buildings. The corn, potatoes, or other hoed crops, could be raised on soil made easy by continued cultivation. The labor of turning over tough swards might all be saved. This might be, if the farmer could always return to his farm all that every crop takes out of it—which he cannot do, because, aside from the fact that were he obliged to do so, no farming (here in Maine,) could be made to pay, he cannot command all the elements of which his soil is deprived by the growing crops. Those elements, which are at his command, are not in the different forms which would be necessary in order for him to apply to each field the precise amount and kind of plant-food necessary for the particular crop allotted to that field and none other. Different plants require different sustenance. There is a recuperative power in nature which is continually at work to supply the waste of the soil; it may be slow, but none the less sure, and not the less to be regarded. While a certain crop is drawing upon the earth for what it needs to grow and thrive upon, this power is storing up resources for another and a different growth. An instance of this is seen in the fertility of land when first stripped of forest, and again in the rapidity with which forest growth succeeds to farm crops. This agency is of course in a great part lost if one undertakes to farm without change of products.

It being granted that a change is necessary, the question occurs, shall it be an indiscriminate change, or a systematic succession of crops recurring at regular intervals, or as it is called, a rotation of crops? Rotation cannot be used under all circumstances—indeed there are probably few farms in this State, certainly very few in the eastern part, where it can be strictly adhered to over the whole farm. It cannot be used upon new farms, nor upon rough, stony, or wet lands, until such are first cleared or drained. It may be the more an advantage in that it requires these improvements to be made, and where it may not be practicable, may be looked forward to as conducive to, and part of, a better system of cultivation. To be sure your amateur farmer, with his ample means and well read brain, can dig stumps, blast rocks, sink drains and build fences, so as immediately to establish such a rotation as suits his fancy; but the poor man who must make a living and reclaim his farm by the labor of his own hands will be a long time in arriving at the same results. He may often work over the same piece, when if he had more means, a new and tough one would be subdued. As for draining, without abundant capital, it must be a work of time.

The advantage of a rotation over a simple change of crops is not difficult to perceive.

The great staple here is the hay crop. We endeavor so to manure and cultivate our lands for one or more years under other crops, as to prepare them to bring grass for a number of successive seasons. Under the ordinary system these lands are mown so long as the crop will pay for cutting. It is considered economy to save all the grass, though the land be run down to utter unproductiveness. The lands which were the best when seeded down, remain down the longest, and so become equally exhausted. Now such a rotation as compels the breaking up of the sward at the expiration of a certain time, though there may still be some vitality in the grass roots, will be a safeguard against this depletion of the soil. Decomposed vegetable matter is the great fertilizer. A good sward is variously estimated to contain from twenty to thirty tons of vegetable matter—say it is but one-half, from ten to fifteen tons, and you have in an inverted sod a very valuable addition of the best of manure. Let your grass ground run out and the sod (on clay ground especially) becomes entirely gone; it has decayed too so gradually as to be of no perceptible benefit to the soil. So too if the land be kept up too long, the fibrous matter becomes entirely decayed, and, if the soil be sandy, it will lack adhesion and become too light. If it be a heavy soil, it will be too adhesive and become baked and lumpy; the rootlets bind the sand and divide the clay.

Any thing which helps to promote system in farming, is an advantage. Rotation will superinduce a more methodical management of other matters upon the farm. It is contrary to nature that a man should be strictly systematic in one particular and not at all so in others. The habit of regularity acquired in pursuing a rotation, will pervade and show itself in all the other operations of the farm. That man would be considered by all as a strange anomaly, who, while adhering to a wise rotation of crops, was still a thriftless and slovenly farmer.

A system of rotation leads to doing more upon the farm, as well as doing it better—to using more manure, as well as applying the same to better advantage. Under the indiscriminate change system, the farmer puts on what manure he can get and where it is most convenient—perhaps a small quantity—thinking it will do for this year, and next year he can go over it again. Under the rotation system he sees that he must have manure enough for a certain field—it must be a sufficient quantity, for it is to suffice for just so many crops, and the field can have no more until its turn comes round again.

It does away with the small patch practice, so destructive of time, with its short furrows, many turns and broken day's works, as well as the more pernicious practice of breaking up larger fields than can be manured, to be cropped and left in a condition more barren than before.

The particular succession which should constitute a rotation may be different in different localities, and depend somewhat upon the character of the farm to which it is to be applied. A simple rotation and one that has been tried successfully is, first, potatoes or other hoed crop, well manured, with clean cultivation; then a grain crop with grass seed, hay for three years, the hoed crop again, and so on. The land is gone over once in five years, and though one dressing may seem scanty for five crops, it is probably oftener than three-fourths of our fields are manured under the old system.

Perhaps on large farms it would be better to take off a crop of oats next after breaking up, then a hoed crop; corn where that succeeds well, then seeding down with barley, wheat, peas or buckwheat—the last, if sown sparsely with a light coat of manure is a capital crop to seed down with. The grass crop may look slim when the grain comes off, but the ground is left light, and if the buckwheat is taken off tolerably early, the grass will come on afterward and be sure to give a good account of itself when haying comes round; then, after three years of hay, introduce two years of pasture. If no pasture, then, especially upon clay loam, more than three crops of hay may profitably be taken off. By applying a dressing of bone dust, guano or fish pomace at seeding down, the field may hold out five seasons in grass. Pasturing is advisable even if it come after that. It is a notorious fact that the old pastures are fast becoming perfect barrens. They have been drawn upon largely and there is no ready way to restore the lost fertility. Now, if our fields can be pastured alternately, much of what is now used as pasture can be devoted to raising wood, as promising a rotation as any one can go in for. The forest growth of a country is universally allowed to affect the fall of rain—so much so that travellers believe that the only reason why Palestine has lost its ancient fertility is that fires have stripped the country of woods, and it is often swept by fires, which prevent the growth, so that there is no rain in summer, and vegetation dies for want of moisture. The summers of Maine certainly appear to be becoming dryer every year. If restoring a growth of wood to barren hillsides will bring refreshing showers to parched fields, it will be the best of rotations. The feed upon cultivated lands is of far superior quality, particularly for dairy stock. The trouble of scouring height and hollow, fell and forest to bring home the cows each night, is all saved. If sufficient pasture is not afforded for the whole farm stock, a selection can be made and such as are not needed often, or do not need the best feed, can be turned out upon the old pastures. Pasturing will eradicate many weeds that have escaped the plow and the scythe. The experience of some in this eastern part of the State shows this to be the case with white weed (ox-eye daisy) caraway and that pest of light lands, with half a dozen aliases, witch grass, couch grass, or whatever it may be called. For this purpose, as also enriching the soil by droppings, pasturing by sheep is best. We will here digress to say that where couch grass has fairly taken possession in pieces of any considerable extent, unless it is convenient to feed it to death with sheep (cattle will do) the better way is to let it have its way, turning it over once in a few years, or when it binds out, plowing shoal, putting on a dressing, harrowing down well and leaving it to come up again and flourish. It produces a good crop while the ground is rich, and cut early, makes fair hay.

Some cultivators disapprove of the latter grain crop, preferring to seed down immediately following the hoed crop, arguing that the land being saved the draft of the grain crop is in better order and will consequently bring more and better crops of grass. Though this course has some benefits, they do not appear sufficient to turn the scale. The first hay crop is apt to be less in quantity as well as not equal in quality, and more liable to be killed out the first winter. Then a crop of barley or other grain at the present high prices will more than make up any deficiency.

Sandy soils will require a rotation extending over less time than the one we have been considering. Such soils will not be likely to hold in grass more than two seasons, and will afford but indifferent pasture more than one year after. Upon extensive farms or those made up of widely differing soils, there can be no objection to using different rotations upon different parts. In this as in other things judgment must be used as well as system.

Where farming is carried on more extensively than in Maine, one year of fallow is made a part of the rotation. Upon an estate in New Jersey where wheat has been grown for a hundred and twenty years, and which the manager claims is steadily improving, the rotation is corn, clover, wheat, grass, fallow, oats. The corn is heavily manured and the wheat is well limed. The fallow is plowed many times during the season. Whether fallowing will pay here in Maine is a question which experiment can best decide. The old idea that land needs rest, is but little held to in these days; still the repeated stirring of the ground in warm weather, exposing the different particles to the action of the air, cleaning the soil of many annoying weeds and improving the mechanical character, while the restorative process of nature, before spoken of, is going on, must be beneficial and may be profitable.

It is not claimed that any one of the different successions mentioned is infallibly the best, or indeed that there may not be a better than either or all, or that any one way is best under all circumstances; but it is claimed, and fact and argument support the assumption, that upon every sufficiently cleared farm, some judicious system of a succession of crops, extending over not too long a series of years, ensuring a change before the soil shall have become exhausted under any one crop, must be adopted, to realize the greatest return for expense incurred, and at the same time most surely and steadily improve the soil.

What the rotation best adapted is will depend upon the nature of the farm, the locality, access to markets, the means of the farmer, and possibly, too, his tastes and disposition. The individual concerned must weigh these things and decide for himself as best he may. It is submitted whether it would not be better to spend money on well conducted experiments in this line, rather than to pay it out in premiums to sundry gentlemen for fast animals or big pumpkins, when oftentimes the simple reason why these gentlemen are more fortunate than their neighbors, is because they have more ample means to lavish upon a single animal or a single crop. It may do upon western prairies, where the decay of the gigantic growth of centuries has accumulated vast deposits of vegetable matter, to plant or sow the same crop year after year, and transport the increase to distant markets, bestowing upon bountiful nature no return; but upon our granite soil every care must be used lest the land deteriorate and fail to yield remunerative returns.

If the crop of last year has drawn so largely upon one particular element as to deprive the soil in a great measure of that element, a following crop of the same cannot succeed, and it is plain that one requiring different pabulum, in part, must be introduced, that the equilibrium may be restored.

The farmer must be on the alert to use every means to make his a paying business. Improvements are going on in all the arts of peace and war. The farmer must seize upon whatever benefits his calling or fall behind a progressing age.

Is it not time that the farmers of Maine adopted rotation of crops as one of the improvements of the age?

Mr. Rogers presented the following report on

The Agricultural Capabilities of Maine.

That the soil of Maine is as fertile and productive as that of the prairies or bottom lands of the West, no one asserts. But that it is capable when judiciously managed of richly remunerating the husbandman for all the labor, care and attention that he bestows upon it, the numerous well conducted farms, with their neat, tasty, and in many instances elegant, farm buildings that adorn our rural districts, abundantly testify.

The farmer of Maine has not so great a surplus for market, as his brother at the West, neither is it necessary; for his smaller surplus of barley, beans and potatoes, to say nothing of oats, apples, hay, &c., will yield a larger cash return than his western brother's big pile of wheat, corn and pork.

Although we import a large portion of our flour we are not without our exports. There was exported from the city of Bangor alone, the past year, upwards of 500,000 bushels of potatoes. The probable total export of the State for the same time, was at least 1,500,000 bushels, which at an average value of forty cents per bushel will amount to $600,000, besides leaving an abundant supply for our own population, more than sixty per cent. of whom are not producers. Maine is capable of producing with ease almost any quantity of these tubers for which she can find a market.

Barley, rye and oats in the larger portion of our State are certain crops, and may be cultivated to a much greater extent than has ever yet been done.

There are annually sent abroad thousands of tons of hay; and the trains upon our railroads weekly testify to the fact that Maine is largely a stock-growing State. The census returns show that she has made decided advances in this particular in the last decade, yet it is evident to any careful observer that very much more may yet be done in this direction. Indeed, precisely *here* is the place for improvement.

Stock husbandry, (including the dairy,) should be the prominent feature of farming in Maine. By making it such, farmers will be enabled the more readily to improve their farms, so that thus we can scarcely conceive of a limit to our capabilities in this respect.

Our State is well adapted to sheep husbandry ; some portions of it peculiarly so. Probably no branch of farming yields a larger return for the capital invested and the attention bestowed than the keeping of sheep. It is somewhat surprising that our farmers have bestowed so little attention upon it. The experience of the older and more advanced agricultural nations goes to show that the keeping of sheep is indispensable to a good system of husbandry even among their densest population and on their highest priced land. And here allow me to extract from the preliminary report of the census of 1860, where in treating upon sheep, it is said, "they afford as much food for man in proportion to their consumption, as any other domestic animals. They are believed to return more fertilizing matter to the soil. In addition to these things, they, alone furnish wool. England proper has about five hundred and ninety to the square mile. The United States proper, (exclusive of territories,) have about forty-eight to the square mile."

In our own State there were returned by the assessors of three hundred and fourteen towns and plantations 334,820 sheep, which would give about ten to a square mile. But inasmuch as about two-fifths of the municipal officers in the State thought the matter of too little consequence for them to trouble themselves to make returns,—upon the supposition of our Secretary made in connection with the report of the returns, that they represented about three-fourths of our farmers, and productive acres, and allowing the proportion to hold good in those places from which no returns were received, we should then have 446,429, being about thirteen and one-half to a square mile, compared with the population less than 71 per cent.

In view of the foregoing facts, will any one presume to say that Maine has begun to develop her capabilities in this branch of husbandry? On the contrary have not our farmers paid too little attention to this matter for their own interest and the good of the State?

In order to develop our agricultural capabilities, we need good home markets and an easy transit from the interior and northern portion of our State.

To create the former, we should use our utmost endeavors to hold out to manufacturers and capitalists, the superior advantages we possess for manufacturing; to show them that we were evidently designed by nature to become a manufacturing State, and to induce them to occupy and turn to good account some of our numerous water-falls which are now unoccupied, or if occupied, are of comparatively little advantage to the occupants or the community.

The proposed Aroostook Railroad would open a communication into a fertile wheat growing country, and not only afford easy transportation for those already settled, but be a means of reducing the wilderness into fruitful fields, and do much towards enriching the State by developing its agricultural capabilities.

In connection with this topic, I would call the attention of farmers to the resources which our State possesses for furnishing plant food in the form of marine manures and more especially fish guano, which is now about being manufactured in large quantities, and at a moderate price, and which promises to be a valuable acquisition to our hitherto limited supply of fertilizers.

Mr. Wasson offered the following on

The Influence of the Agricultural Press.

Some fifty years ago, the first agricultural paper in this country was started at Baltimore. The idea of teaching farmers anything in that way, was hooted, as simply ridiculous. At the present time when sixty or seventy periodicals are devoted to farming, when hundreds of thousands of dollars have been spent on these publications, when the best talents practical and theoretical are employed to make them instructive and useful, with too many the idea is still simply ridiculous, and many more *expounders* in agriculture sympathize in harmony.

Agriculture is eminently an experimental science. The farmer needs the experience of others, together with his own, to establish new facts. The result of his own observations, coinciding with the observations of his neighbors, suggests new improvements. But the farmer from the isolated nature of his vocation—being a large portion of his time alone in the field—has but little time and less opportunity for social intercourse, and, by mere force of habit, becomes a kind of unsocial being. Having ears he hears not the experience and suggestions of others, and to the improvements around him he is a stranger. But through the medium of an agricultural publication, he sees at a glance what improvements his brother-farmers are making, and what has been the accumulated progress of the agricultural world.

The object of every farmer, is success with the least manual labor. He may be directed by his taste or capacities to some special department of agriculture, as the rearing of stock, or the cultivation of corn, or the culture of fruit, or a mixed husbandry, and in either case, the question is, how shall success be easiest and most successfully attained? A problem that may cost a lifetime to work out, when its solution, how some have succeeded, and why others have failed, may be found in any reliable agricultural journal. Therein the ways and means of others' prosperity become common property at a trifling expense.

Let every farmer ask himself, what would be the effect upon the public prosperity were the agricultural papers and periodicals and associations to become non-existent, the concentrated action, power and progress of the farmers dissevered, and each compelled to rely upon his own puny exertions,—such a "dissolution" would not only follow as the worst of traitors in their deepest rancor never thought of, but universal adversity would overflow the land.

The wealth of a country is based upon the surplus of its agricultural products, hence the debt of a government is paid in large measure from the cultivated lands of the country. And if *that* cultivation is to be carried on without associated effort, without concentrated action, without the agency of the agricultural press, the gloomy prospect becomes gloomier still.

In every other pursuit of life, success depends very much upon an exchange of ideas, which exchange is effected by the public press, becoming as it does a weekly summary of new ideas, discoveries, conditions and proximate methods; reflecting, not "as in a glass darkly, but face to face" the progress of the day. Saith the Latin proverb, *Nemo solus sapit*, no one is wise alone, a truth preëminently applicable to the farmer.

Of all the characters in the great drama of life, none are more unsuccessful or unwise than that man whose mind is already surfeited with his own individual egotisms.

The other great enterprises of life, the commercial, manufacturing, mechanical and maritime, have their monthly, weekly, semiweekly, daily, morning and evening editions, an *epitome* to direct through the voyage of life. And can the ship of agriculture, upon that stormy sea, keep her reckoning, without quadrant, chart or compass?

The advice of the celebrated Bakewell to farmers was, "to spare no pains to know what others were doing;" and in this fast age, when everything is upon the high pressure principle,—when centuries are crowded into months, he who heeds not the advice, pays dear for the whistle. Solomon, the wisest of men, said, "get wisdom, and with all thy getting get understanding;" and another wise man has said, "reading makes the ready man, but practice the perfect man." So to the farmer; reading—book-farming, if you please—is an important auxiliary to success, the *sine qua non*, but *not* the *ultimatum*.

No farmer can hope for success at the present day in the vast field of agricultural competition, who does not know what improvements others are making; and *no man can know that does not patronize the agricultural press.* The reading and the non-reading farmer are as opposite as the very antipodes. The first farms by rule, reducing his labors to a system by well demonstrated agricultural theorems, avails himself of every improvement in husbandry, favors the introduction of labor-saving implements, believes that "blood *will* tell," and in the race of progress is ready to start with the age—the second, to use a cant phrase, "goes it blind," farms by accident; as his paternal ancestors did so does he, believes in making hard work harder, knows the natives are best, is sure that book-knowledge is a humbug, and agricultural societies a nuisance. With such qualifications he must inevitably be a mere visionary in theory and a loser in practice.

We are prompted to these expressions by no pecuniary interest or influence whatever, but solely a desire to better the condition of our fellow-husbandmen. To the farmer, *this* is the time to "try men's souls," and well may he take hold of the plow with serious thoughts. Superadded to the wants of Europe, which are emptying our immense granaries, is that of our vast army, with its increasing demands upon our flocks and fields, and when the proportion between consumers and producers is rapidly increasing against the producer, is an anxious present with a clouded future, unless every farmer will avail himself of every agricultural improvement. But a small portion of our knowledge can be derived from our own personal experience, hence the necessity of some cheap, practical aad direct method of adding to our fund of knowledge, which, fortunately, is through the medium of the agricultural press.

Dr. Weston presented the following paper relating to the doings of

The Bangor Horticultural Society.

By Dr. J. C. Weston, Secretary.

The Bangor Horticultural Society is the oldest in the State. It was incorporated in 1849, and has therefore been in existence fourteen years. It has conferred a great benefit on all the surrounding country. By its exhibitions and awards of premiums, it has excited competition and stimulated the people to cultivate the very best varieties of pears, plums, apples, grapes, &c. It has developed a taste and rivalry in the cultivation of ornamental trees and shrubs and all the products of the best furnished gardens. Under its auspices every desirable new fruit, flower, and vegetable of native origin have early been introduced to the knowledge of the community.

It has had meetings for the discussion of such practical subjects as manures, draining, grafting, the best varieties of fruits and vegetables and the best method of cultivating them. It has also had valuable practical lectures.

A few years ago but one glass structure existed in the city for the cultivation of foreign grapes, built by Frederic Hobbs, Esq., the first President of the society. The beautiful clusters raised by his skillful cultivation and management appeared on the tables at our exhibitions to feast and delight the eyes of all beholders. The example was contagious. What had been done by one, others thought they might accomplish, and gradually twenty-seven other graperies sprung into existence, yielding thousands of pounds of delicious grapes, and adding thousands of dollars to the value of real-estate.

By the influence of this society, Bangor, like Damascus, has become a city of gardens, many of which are laid out in tasteful, picturesque forms, and make many a home beautiful and attractive, so that emigration has no charms for the occupants. They are firmly rooted to home soil and pay cheerfully the taxes to support a government which has given for a few years $150 annually to promote Horticulture, while they have invested thousands for the same purpose.

The most of our merchants and mechanics, when about to erect dwellings, purchase double lots, that each may possess his own garden, where he may sit under his own vine and fruit tree; and thus becoming interested in the culture of the soil, our men of wealth often enlarge the spheres of their operations, by purchasing farms in the adjoining country, and improving them according to the best system of modern husbandry, and some instances might be mentioned where these farms pay a larger dividend than bank stock, or stock in trade, or manufactures.

The society has had an annual exhibition every year but one since its formation. In 1857, by invitation of the Trustees of the Maine State Agricultural Society, it united with that body in its exhibition at Bangor, and contributed its full share to make it interesting and attractive.

At its exhibitions, the best varieties of peaches, pears, plums, grapes, flowers and vegetables have been represented. Our plums, particularly, have been unsurpassed in color, size and quality. I have attended exhibitions in Boston, New York and Montreal, but have never seen elsewhere, such a variety of this fruit as in our own city, in years of plenty.

Last September, in spite of the severity of our winters, the specimens of pears and American grapes of open culture, exceeded in quantity those exhibited on any former occasion, evincing an increased interest in the cultivation of those fruits. The Delaware, Hartford Prolific and Rebecca were nearly ripe on the 17th day of September, but the Concord, Diana, and Isabella had not colored, except on girdled branches.

Apples appeared in greater abundance than ever before. Two members, each, exhibited ninety varieties. Raising so many kinds is not so profitable to the orchardist as a select few of the best quality; but we have every year offered premiums for the largest and best variety of this and other fruits, with a view of ascertaining what kinds are best adapted to our climate and soil. The principal producers of fruit were requested to furnish the Secretary lists of apples, pears, plums and grapes which each had found by experience to be the very best for general cultivation in Bangor and vicinity, taking into consideration hardiness and productiveness of trees and vines, and quality of fruits. By inspection of these lists, it appears that a majority agreed in recommending the following apples: For summer—Bell's Early, Red Astrachan, William's Favorite, except for light soils, Benoni and High Top Sweeting. For autumn—Duchess of Oldenburg, Porter, Gravenstein, Winthrop Greening or Lincoln Pippin, Hubbardston Nonsuch, and Fameuse or Snow apple. For winter—Blue Pearmain, Yellow Bellflower, Rhode Island Greening, Ribston Pippin, Tolman's Sweeting, Baldwin grafted into large trees, and Northern Spy. Some two or more of the minority have concurred in recommending Early Harvest, Sweet Bough and Sweet Quincing for summer. Fall Jenneting, Sweet or Golden Russet, Killam Hill and Maiden's Blush, for autumn, and Jewett's Red, Mother, Danvers Winter Sweet, (in strong rich loams,) Esopus Spitzenburg, Roxbury Russet, and Red Everlasting, for winter and spring. One each also recommends Summer Rose, Fall Pippin, Hawley, Northern Sweet, Shop, Minister, Wine Apple, Nonsuch, Vandevere and Ladies' Sweet.

Of these varieties, it is apparent that the first eighteen are the most popular, and they are recommended for general cultivation in our locality; while the others promise well and deserve a further trial to secure the favorable consideration of orchardists.

The Duchess of Oldenburg is one of the most hardy of all trees, and doubtless would flourish in the most Northern part of Maine, if engrafted on native stocks. It is a constant bearer—the fruit, though surpassed in flavor by other varieties, is of good quality and suitable for cooking at an early age. The Blue Pearmain is also very hardy, but rather a slow grower. The Baldwin is tender when grafted into small trees, but succeeds well when inserted in full grown native stocks. The first trees of this kind introduced from Massachusetts, some thirty years ago, required some time to become acclimated. When they first bore, the fruit was entirely green, not possessing a particle of the red color peculiar to this apple, but in a few years it acquired it. This is not the case with grafts inserted on native stocks, but they produce from the first, well colored fruit, not quite equal in flavor and size to those of its native state, but will keep until a later period in the spring.

The tree of the Rhode Island Greening is apt to decay early at the heart in some localities, from some cause or disease not ascertained, and this peculiarity in the estimation of some has diminished its value. The Esopus Spitzenburg succeeds well in warm virgin soils containing a sufficient supply of potash and lime, particularly when engrafted in the top of a well-grown native tree, but the growth is slow and the fruit inferior on old impoverished lands.

The Red Everlasting is said to be one of the most sprightly and fresh of all late dessert apples.

The Northern Spy has rapidly acquired the favor of our orchardists. Its flesh is mild, juicy and fresh after long keeping and commands the highest price in the market. The tree is of rapid, upright growth and needs judicious pruning when young, that it may form open heads, and its fruit may be fully exposed to the sun, as it is insipid in the shade.

Our fruit-growers, when selecting trees in a nursery, give a preference to those which throw out their limbs horizontally—for experience has taught that those branches which grow from the trunks at an obtuse angle, are stronger at the point of juncture, and less inclined to split off than those which form an acute angle. Crotched trees are rejected, on account of this liability to split apart.

One of our nurserymen, Mr. A. Noyes, has been very successful in growing the apple on the paradise stock, by which it is very much dwarfed, so that the trees can be raised six or eight feet apart. They are well adapted for gardens and bear abundantly, but are more suitable for the amateur than the orchardist.

The apple tree cannot be made to grow well in light sandy soils, where the white pine has flourished for a long series of years, and where there is a deficiency of potash, unless the land is first enriched with a compost of ashes, lime, muck and stable manure, and after the trees are set out, it is necessary to mulch the ground under them to prevent evaporation until they make sufficient progress to shade it completely, and it is important to encourage the limbs to grow as low down as possible. In this way only can complete success be attained in such localities. The compost just mentioned is a good manure for the apple tree in any locality. A preference is given to oyster shell lime, when it can easily be procured.

Our best and most popular pears are Doyenne d'Ete, Dearborn's Seedling, Tyson, Bartlett, Fulton, Flemish Beauty, Beurre d'Amalis, Louise Bonne de Jersey, Urbaniste, Seckel, if grafted in the top of a thrifty growing tree, St. Ghislain, Winter Nelis, Easter Beurre, and Vicar of Winkfield for cooking. The Doyenne d'Ete is tender on the quince stock, but is hardy on the mountain ash.

In severe winters, some of the branches of the Bartlett are killed when unprotected; but it is hardy when grafted on the wild pear stock. The fruit, however, is sometimes insipid. The Louise Bonne de Jersey and Vicar of Winkfield, in some localities, are also tender. The rest are comparatively hardy.

In the city gardens, pears have been grown, principally, on the quince stock. The trees are headed back and the branches encouraged to grow near the ground. Early in September the ends of the branches are cut off to check their further growth and cause the wood to ripen, but with all our care, the more tender varieties are sometimes killed down to the snow. But it has been discovered that pears are hardy when grafted on the wild pear stock or "shad-bush." One of the members of this society, Mr. Jefferson Stubbs of Hampden, has used this stock for the last ten years. He already has a pear orchard of two hundred and fifty trees, and intends to add two hundred more next spring. He transplants the trees from the woods, cutting off all the branches when they are tall, so as to force the latent buds to start, and after they have grown a year or two, he inserts the grafts, and they take effect as readily as on other stocks. He claims that they bear early and constantly, that they are perfectly hardy, that he has not lost a single tree from the effects of winter. He has already had experience with the Madeleine, Tyson, Buffum, Pratt, Bartlett, Flemish Beauty, Onondaga, Louise Bonne de Jersey, Seckel, Beurre Diel, Urbaniste, and Winter Nelis. Pears generally prove more hardy, also, on the mountain ash and pear stocks, than on the quince, but the quality of some is inferior.

Plums. Our most experienced cultivators recommend the Green Gage, Washington, Jefferson, McLaughlin, Imperial Gage, Smith's Orleans, Lawrence's Favorite, Washington Seedling, Purple Favorite, Bleeker's Gage and Lombard, and the Damson and Yellow Egg, for preserving. The first-named are decidedly the best. The Columbia is a large and handsome plum; but its meat is rather coarse and sometimes lacks flavor, and the tree is an awkward and scraggy grower.

Grapes for open culture. The Delaware for our climate is the best and most desirable of all grapes. It is hardy as an oak, is sure to ripen its fruit, however unfavorable the season, and its flavor surpasses all others. Every farmer ought to possess it. The Hartford Prolific is also very hardy, early and productive—

will thrive in the open field, even with careless culture, wherever corn will grow. The Rebecca is of excellent flavor and generally ripens its fruit; but is less hardy, and requires a dry, protected location. The ends of the branches do not always mature. The Diana and White Sweet Water, Logan and Concord, if trained against a wall and protected from the early frosts of autumn, will also mature in most years; but the Isabella, even under the most favorable circumstances generally fails. When girdled it will color before the last of September, but seldom becomes sweet and good. By removing part of the branches, and judiciously thinning the berries from the remainder, the ripening of grapes may be hastened at least a week. If a third are removed, the fruit will be larger and better.

Cherries. No cherry is perfectly hardy in Bangor, except the Kentish or early Richmond. These become quite sweet, if allowed to hang on the tree some time after they become red. In favorable seasons, the May Duke, Elton, Black Eagle, Downton, Honey Heart, and Downer's Late have been raised.

Grafting. The modes of grafting practiced by our horticulturists, differ somewhat from those employed elsewhere. By one method the stock or limb is scarped off at an angle of about forty-five degrees. The scion is split up two or three inches with one side thicker; the inside of the thicker part is made smooth with a sharp knife, and the end sharpened on the outside, and the bark of the stock opposite the scarf with a thin sliver of wood is cut down and it is thrust under it. The thin part is brought down over the scarf and inserted beneath the bark as on the opposite side. The bark is then bound over the forks of the scions by strips of grafting cloth, which is also passed neatly over the cut surface. The scion unites readily with the stock on both sides; the juncture is perfect and the wound speedily heals.

Another mode introduced to the knowledge of the community by George P. Sewall of Oldtown, is the following: Cut a T in the bark on the upper side of the limb, in the spring, after the leaves have pushed and when the bark peels easily; scarp off the scion on one side and sharpen its point by cutting off a little each side of the round part, that it may slide down well, and then press down the scion; put a little grafting wax over the corners, and bind around strips of list. As the scion grows, the ends of the stock or branch are gradually shortened and the binding loosened.

When the scion becomes long and heavy a piece of list is passed around it and the branch to confine it and prevent the wind from blowing it out before the union is strong and perfect. Finally in a year or two the branch is entirely removed and the scarp made in the act being underneath, heals more readily. The advantages of this method are: that the growth of the tree is not checked; the process is quickly performed, and it is very successful, particularly on thrifty trees.

Grafting by approach has been used for the grape vine, when two branches of different vines are near each other, or a vine in a pot can be obtained. The bark and a sliver are removed from the sides, so that when brought in contact, they will closely fit and they are bound together until a union is effected, and then the branch which is to be discarded is removed and the connection with the vine which has been used for the scion is severed.

Of currants, a new variety, the Versaillaise, surpasses all the others. It is very large and the bush is a great bearer. Red and White Dutch have long been cultivated, and the Red and White Grape have been introduced.

Some twenty kinds of gooseberries have been cultivated, but none have escaped the mildew except the Houghton's Seedling, and this variety cannot be too highly commended.

Raspberries. Red and White Antwerp, Knevett's Giant, Fill Basket, Franconia, Brinkle's Orange and Catawissa have proved the best. The Catawissa is an everbearing variety and differs essentially from the others. Instead of producing its fruit chiefly on the old wood, it bears mostly on wood of the current year's growth and continues until prevented by frost. Its size is large and color deep crimson.

Strawberries. The Wilson's Albany, Cutter's Seedling, Austin Shaker, Hooker's, Boston Pine and Downer's, have all succeeded well in our vicinity, and have been prolific. For productiveness and profit the Wilson's Albany stands first and the Cutter's second. For flavor, the Hooker's and Downer's are the best. The Cutter's and Downer's have strong stalks, which are not apt to bend to the ground under the weight of their fruit.

One cultivator, Mr. J. P. Sinclair, brought into market the last season (1862) six hundred and forty boxes, the produce of five kinds, and Mr. A. Noyes raised about six hundred quarts of the best varieties.

It is estimated that twenty-five hundred bushels of the smaller fruits have been raised the last year in Penobscot county.

What the Bangor Horticultural Society has accomplished for all the surrounding country, similar associations can effect in their several localities, until, from these common centres, a benign influence shall go forth which shall encircle the whole State. By ascertaining the varieties best adapted for every soil and place, by collecting the lessons of experience, by diffusing knowledge in respect to the cultivation of fruits, and *especially the apple*, an increased interest may be excited, so that Maine, at no distant day, may not only raise enough for home consumption, but also a surplus for a foreign market, and thus may add hundreds of thousands of dollars to the valuation of property. A consummation so desirable is worthy our warmest zeal—our most persevering efforts.

On motion of Dr. Weston, the following resolve was unanimously adopted:

Whereas, It is the province of the Board to prescribe and determine the duties of the Secretary, and whereas the more extensive culture of fruit in the State is extremely desirable, therefore

Resolved, That the Board of Agriculture recommends to the Secretary, in addition to his other duties prescribed by statute and by former votes of the Board, an investigation of the subject of Fruit and Fruit Culture in Maine, during the current year, and the preparation of a leading paper on the subject, to be included in his next annual report.

The following communications were presented and read:

From Joseph M. Smith, Anson.

My flock of sheep in the spring of 1862, was composed of sixty-seven ewes, four wethers, and forty lambs (or one year olds.)

From my ewes I raised sixty lambs; I sheared seven hundred and thirteen pounds from the whole flock, which I sold at fifty

cents per pound, amounting to the sum of . .	$356 50
Sold ten old sheep for	30 00
One ewe, ...	6 00
Ten lambs, $6, ...	60 00
One for	9 00
One for	8 00
One (ewe) for	9 00

One (ewe) for	$5 00
Four for	32 00
Was offered $6 per head for thirty-eight, amounting to	228 00
Total income, ...	$743 50

Equal to $6.70 per head.

The above sheep were Spanish Merinos, and samples of the wool were presented with the statement.

An experiment in the use of Superphosphate of Lime.

S. F. Perley—*Dear Sir*:—At your request, I send you the following statement of my experiment with *Superphosphate of Lime and pumpkins among corn.* About the middle of May last, I plowed a field that had been in grass five years, and the yield had become so reduced that it was unprofitable for hay. After plowing, I spread on stable manure at the rate of seven or eight cords per acre, and harrowed it in. I also procured of Kendall & Whitney, a barrel of Coe's Superphosphate, and mixed it with about half its bulk of plaster, and directed a quantity, perhaps two or three spoonfuls, to be put in each hill of corn and slightly covered before dropping the seed. When the man at work dropping the fertilizer had gone over nearly half the field, he came and told me that the Super-phosphate would not hold out to go over the whole at the rate directed. I told him to diminish the quantity so as to make it go over the whole, except six rows through the middle of the field to be left without any. But on these six rows I directed him to put about the same quantity of plaster to a hill that in the mixture would go upon the rest of the field, so that I might fairly test the effect of the Superphosphate. I gave the boy who dropped the corn some pumpkin seeds to plant with it, and being a liberal handed boy, he bestowed all his pumpkin seeds on the first sixteen rows. At the first hoeing I had a gill or more of ashes put on each hill through the field.

The result. After the corn was up nearly large enough for the second hoeing, one of my neighbors remarked that a strip of my corn through the middle of the field *looked as though it had fainted away.* There was a marked difference in the growth through the whole season. At harvesting, the yield was as follows:

Six rows without Superphosphate, eight bushels of ears good corn, three small or unripe.

Six adjoining rows with Superphosphate, eleven bushels of good ears, two small or unripe.

Sixteen rows with pumpkins, twenty bushels of ears good corn, six small or unripe.

With Superphosphate, one and five-sixths bushels of ears good corn, per row.

Without Superphosphate, one and a third bushels of ears good corn, per row.

With pumpkins, one and a quarter bushels of ears good corn per row.

Giving half a bushel to a row more with Superphosphate than without; and the pumpkins more than neutralized all the good effects of that fertilizer, although they were planted on that part of the field which had the most liberal supply of it. The crop of pumpkins was not worth half as much as the corn was damaged by them. The six rows with Superphosphate which were measured, grew in that part of the field which had the reduced quantity. I suppose there is nothing gained by putting plaster with Superphosphate of lime, as in the manufacture of that article from bones and sulphuric acid, sulphate of lime or gypsum is formed, and becomes a portion of the article as sold.

Yours truly,

M. Gould.

North Bridgton, Jan. 22, 1863.

Mr. Rogers gave the result of an experiment he had made with concentrated manure upon potatoes. The soil a clayey loam; the land prepared and seeded in every way precisely alike, the only difference in treatment being in the different kinds of manure applied.

A given number of rows produced with no manure, seven-eighths bushel.

American guano, one and a half bushels. Increase seventy-one per cent.

Coe's Superphosphate, two bushels. Increase one hundred and twenty-nine per cent.

The concentrated manure was applied at the rate of about five hundred pounds per acre, and a larger proportion of merchantable potatoes were found in the rows manured with the American guano.

Profits of three Cows.

Dr. Weston—*Dear Sir:*—As you have a sample of our cheese, it occurred to me that a statement of the products of my three cows might not be amiss.

Accordingly, I have gone over my cash book and gathered the amount of sales of dairy produce for 1862. I kept the past year, three cows, one of which calved in September, 1861, and has been farrow since.

514 gallons milk sold, averaging 14 cents, . .	$71 96
263 pounds butter sold, averaging 19½ cents, . .	51 28
345 pounds cheese sold, averaging 9 1-6 cents, .	31 62
365 gallons milk used in family at 10 cents, . .	36 50
98 pounds butter used in family at 19½ cents, .	19 11
42 pounds cheese used in family at 10 cents, . .	4 20
2 veal calves sold, ...	8 00
90 pounds cheese on hand (now worth) 12 cents, .	10 80
	$233 47
The estimated cost of keeping the cows for 1862, at $40 each, ...	120 00
Balance in favor of cows, labor, &c., . . .	$113 47

In the above statement, I have not taken into account the value of the sour milk and whey fed to the cows. I do not consider my cows extra ones. Neither do I think the above statement shows better profits than most farmers *might* realize with proper care and attention. But I do not believe that one farmer in twenty can make so good a statement. My crops are principally hay and grain. I commenced in 1861, keeping sheep; think they pay the best of any stock. And this reminds me that we "sheep keepers" demand of the Board of Agriculture all the influence you can exert with the Legislature to give us additional protection from *dogs and cattle at large.*

Respectfully,

W. W. Johnson.

Brewer, Jan. 20, 1863.

The Business Committee having reported, and Committees having been appointed to investigate the several topics presented, Dr. Weston, for Committee upon First Topic, submitted the following Report and Resolutions relative to

Agricultural Education.

What further means should now *be adopted to promote Agricultural Education in Maine?*

No one, like the fabled Minerva, makes his entrance on the stage of life fully developed and prepared to engage successfully in any avocation. All need that mental discipline which shall give them quickness of perception, a retentive memory, a habit of thinking and reasoning, and language to express their ideas. All require that physical training which shall produce a healthy development of their whole physical organization, so that a sound mind may dwell in a sound body; and all need that moral instruction which shall prompt a ready obedience to laws, both human and divine.

Such a comprehensive preliminary training is important for all ranks and conditions of men, for the most limited capacity, as well as the mightiest intellect; for the most humble laborer, as well as the most exalted ruler. By means of it, all are better prepared for the actual duties of any profession, art or business.

Knowledge, when practically applied, becomes a power—a lever which shall move the world, and send it onward in a career of progress and advancement. No matter how low the occupation, how menial the employment, intelligence elevates and ennobles. It secures, in the best manner, the most beneficial practical results, with the least fatigue, the least possible expenditure of strength. The greater the intelligence, the greater the success in any pursuit.

Besides the general discipline required by the great mass of mankind, a *special* education is necessary not only to fit students for the professions, but also adapted to the wants of that largest and most important class of the community, comprising the agriculturist, the mechanic and the merchant.

Youth, it is generally conceded, is the most favorable period to acquire this knowledge. It is the age of leisure, of exemption from the cares and perplexities of business. Ideas then received are stamped with an indelible impress on the fresh tablets of the memory. Correct moral principles then instilled, grow with the growth, and strengthen with the strength, until they become incorporated with the very being. Youth is emphatically the spring-time of life. The seeds of knowledge then sown will the more surely germinate, and at maturity yield an abundant harvest of usefulness.

The State has provided for the education of all the children and youth, by establishing common schools, where the rudiments of knowledge may be learned by both poor and rich. It has instituted academies, where higher attainments may be made. It has founded colleges, where a small fraction of the young men who have the time and means, can avail themselves of the thorough course of preparatory discipline afforded by classical studies and mathematics. It has added special schools of Divinity, Law and Medicine, to qualify them for the practice of either of the learned professions.

These have all been connected together like separate links in the same chain. The goal continually in view, in the great race of life, by those who aspire to a liberal education, has hitherto been to reach at least one of the professions, or take their chance in the mazes of politics. Hence the whole course of instruction is subservient to this great end. The academy takes its pupils from the common schools, and drills them principally in the pure mathematics and the dead languages. They then enter college, and devote a large proportion of the time to the same classical studies. At length they graduate after some seven years constant discipline ; but having expended so much time and capital in this preliminary training, they think they cannot afford to engage in any common industrial pursuit, and have no inclination for it. Custom, supposed interest and pride, all prompt them to enter such special schools as shall best qualify them for the practice of the profession selected. Thus it often happens that the supply exceeds the demand, and the professions are crowded. Some monopolize the business, while others obtain little patronage ; yet the latter, from want of the requisite practical training, are unfitted for, and disinclined to, any other occupation, and in some instances become the drones of the community:

It is not intended to disparage, in the least degree, the system of education adopted in our academies and colleges. It is doubtless the best which the experience and wisdom of ages could establish, for those who design to devote their lives to some regular profession, or the pursuit of literature ; but it does not supply the wants of a large majority of young men who need an education for agriculture or the mechanic arts.

It is not creditable to our country, that while we have surpassed most European nations in the number of our common schools and colleges, we are greatly behind them in institutions designed to teach the innumerable applications of science to agriculture, and throw a charm around this noble employment. Only New York, Pennsylvania, Maryland, Michigan and Iowa have each established one, and even all these are not in successful operation. New England is entirely destitute. And yet three-fourths of the people of the United States are agriculturists;* and it has been estimated that nine- tenths of the fixed capital of all nations is invested in the same pursuit. Statistics collected in the State of New York, show, notwithstanding the enormous wealth of the metropolis, the agricultural interest pays four-fifths of all the taxes.† Although England is called a manufacturing country, yet the returns of her income tax show that two thirds of all the net income from the industry of the nation is derived from agriculture.

Daniel Webster, after observing with his keen intellect the prosperity of agriculture in England, thus speaks of its great relative importance: "No man in England is so high as to be independent of this great interest—no man so low as not to be affected by its prosperity or decline. The same is true, eminently, emphatically true with us. Agriculture feeds us; to a great extent it clothes us; without it, we could not have manufactures, and we should not have commerce. These all stand together like pillars in a cluster—the largest in the centre, and that largest is AGRICULTURE."

An interest of such vital, intrinsic importance, underlying and contributing to the prosperity of all others, especially deserves the fostering care of government. It ought to make as ample provision for the education of the masses for practical life, and particularly for agricultural pursuits, as it has hitherto made for those intended for professional and literary life. Recognizing, then, and appreciating the fact that a large proportion of its citizens must devote themselves to the cultivation of the soil, it should prepare them to engage in it, intelligently and successfully, by such instruction as shall make them thoroughly understand their business.

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* See Patent Office Report on Agriculture for 1861, page 5.

† See Report on Agricultural Education, by Hon. Henry F. French, page 277 of the Transactions of the Mass. Society for Promoting Agriculture, 1859.

The State has already partially attended to this duty. It has established a Board of Agriculture, whose especial office is to investigate and discuss all such subjects relating to agriculture and horticulture, and the arts connected therewith, as they may deem expedient, to disseminate among the people useful facts, discoveries, improvements and theories, by reports and essays, and to make such suggestions and recommendations to the Legislature, from time to time, as the interests of agriculture may seem to require.

The State has also incorporated agricultural and horticultural societies, and has annually appropriated money to be offered in premiums for the best animals, crops, dairy products, improvement of soils and manures, &c.; and has required in return, from each society, a full and accurate statement of the process or method of rearing, managing, producing and accomplishing the same, together with its cost and value, with a view of showing the profits or benefits derived or expected therefrom; also the leading features of the annual exhibition, the character of the efforts of the society for the advancement of agriculture, the prominent crops grown in the county or district, the success attending their culture as compared with former years, and the obstacles met with; and generally upon the condition, prospects and wants of agriculture, so far as they may be able to ascertain them, together with any reports of committees, essays, addresses, or other papers presented to the society, containing matters of general interest.

The State, by means of the scientific survey, is giving us some adequate conception of our own resources for agriculture, manufactures and commerce; of our physical geography, agricultural capacity and geology; of our zoology, botany and entomology; of our soils, mines and quarries.

By these several methods, useful knowledge has been obtained and diffused, which, like leaven, is permeating the community and silently working out beneficial results. Agricultural journals and farmers' clubs have coöperated, and we already see the good effects, on comparison of census returns of the State for 1850 and 1860, in the increase and value of farming implements, live stock, and farm products.

The State has thus provided for the instruction chiefly of its *adult* population. But the time has come when it ought to take another step in advance, if it would keep pace with the progress of other nations. It ought now to give all its children and youth an opportunity to acquire a knowledge of the principles of practical agriculture. In all our district schools, besides the common branches now required to be taught by statute, such as reading, writing, spelling, arithmetic, grammar and geography, easy primary lessons in chemistry should be given on the properties of elementary substances, their mutual combinations, the modes of separating them, with the application of such knowledge to the explanation of natural phenomena and to useful purposes in the arts of life. Also a knowledge should be imparted of the first principles of natural philosophy or of the laws of motion and mechanical forces; of botany, or the structure and growth of plants; of physiology, or the requirements of plants and animals; of geology, or the origin and nature of soils.

If suitable elementary treatises on these subjects cannot be obtained, the teacher might talk familiarly about them fifteen or twenty minutes daily, and illustrate the first principles by a few simple experiments, and thus afford agreeable relaxation, awaken an interest and develop a taste for these studies.

In all our High schools, these sciences should be more thoroughly taught, more amply illustrated; their relations to the useful arts more fully explained, and more time devoted to their investigation.

But most of all, there is an imperative necessity that the Legislature should now found an Agricultural College, with an experimental farm and accomplished instructors to teach all its pupils in the lecture room, in the laboratory, and in the field, all the innumerable applications of science to Agriculture and the Arts; to accustom them to the best methods of cultivation, and the skilful use of the best farm implements; to acquaint them with the best farm buildings and the different breeds of animals; to enjoin upon them system, and habits of careful observation and reflection; in fine, to make them compehend all the principles, the whole science of husbandry with all its practical details, and the reasons for them, and at the same time to give them a fondness for this noble occupation.

Thus the brain and the hand, the heart and the muscle would all unite in its prosecution and would conduct its operations with success and profit. Intelligence would then be wedded to labor; the first minds of the age would engage in agriculture, instead of rushing into the professions, when it was apparent that capital and labor might be invested in it with as much certainty of paying a remunerating dividend as when ventured in any other business.

Demonstrate to the community that farming would be profitable, and capital would flow abundantly into this channel, and so capital, intelligence and labor, would all coöperate to bring agriculture to a high degree of perfection; then, and only then, will it thrive—when this confidence is secured, and the necessary means freely applied.

A class of men like the stewards of England would be educated, who might be employed by the wealthy to superintend the farms they purchase, when, advanced in years, they engage in a new branch of business for which they have had no previous experience and training, and so by aid of such an overseer incur no risk of disastrous failure.

Already there is a demand for such men which cannot now be supplied. The College contemplated alone can furnish the agents who shall be entrusted with the funds awaiting investment, and who can obtain for their services a larger compensation than the average income of professional men.

Teachers and lecturers would be properly qualified for our schools of various grades who may radiate the light of science and intelligence to our remotest borders. Thus "many shall run to and fro and knowledge shall be increased."

For want of this scientific knowledge our whole country has seriously suffered. Our most fertile fields have been impoverished by an unwise system of husbandry. During a long series of years, cattle and grain have been conveyed away to a distant market; the products of their final decomposition have flowed down our sewers into rivers, and been lost in the ocean, and no equivalent has been returned to the soil to repair the waste. Our soils once abundantly possessed all those mineral constituents essential to the growth of plants.

True wisdom, which scientific knowledge imparts, would have taught the farmer to ascertain the chemical ingredients of the products transported, and would have prompted him to return a sufficient amount in the form of manures. Then their primeval fertility would not have been impaired; then we should not have to regret the disastrous effect of the "spoliation system," as it has been significantly called.

In many of the oldest States the average product of wheat has decreased one-half in less than fifty years, while in Great Britain during the same period, it has increased one hundred per cent. in consequence of a more intelligent cultivation.

From these facts, the inference is unavoidable that the older farms have degenerated; that some of the elements in the soil, essential to the constitution, health and growth of the great staples of the country, have been diminished by continued cropping and need to be restored.

An Agricultural College would teach our farmers how to ascertain what is requisite to render an impoverished soil again rich and productive, and how to increase their crops without impairing the fertility of their fields.

Such institutions are especially needed in all the States to give a new impetus and prosperity to all the productive interests of the country in this great emergency. We are in the midst of a great revolution, not only social and political, but industrial and economical. There has been no rebellion in the history of the world equal in magnitude to the present. Nearly two millions of men are arrayed against each other in deadly strife for conquest and power. Every single individual has daily wants to be supplied. Each soldier must be fed and clothed. His wages too, must be regularly paid. If sick, he must be nursed and healed. If disabled, he must be pensioned. The expenses of this war affect both the present and extend far into the future.

Money goes, and must continue to go in a perfect flood. We are piling up a debt of scores of millions every month, and it will continually increase until the wicked rebellion is crushed. This national debt, like a great incubus, will rest heavily upon the productive resources of the country. We must sustain it, and be taxed to provide means for its payment. Hence these interests should be appreciated and fostered, that they may be able to bear the burden and finally extinguish the debt.

Impressed by these considerations, the present Congress, (the 37th,) notwithstanding the heavy responsibilities and arduous duties occasioned by the war, has recognized the importance of agriculture and kindred pursuits, and with far reaching sagacity has established a National Department of Agriculture at Washington. It has also found time to mature and pass "An act donating lands to the several States and Territories which may provide Colleges for the benefit of Agriculture and the Mechanic Arts," and which express their acceptance thereof, with the annexed conditions, prior to July 2, 1864.

By the provisions of this act an amount of public lands is offered to Maine equal to 30,000 acres for each of its members of Congress, according to the last apportionment. As we have five Representatives and two Senators, this would give 210,000 acres as our portion.

It is also provided that ten per cent. accruing from the sale of these public lands, may be expended for lands, or building sites, or experimental farms, whenever authorized by the Legislature, and that the remainder "shall be invested in stocks of the United States, or of the States, or some other safe stocks, yielding not less than five per centum upon the par value of said stocks; and that the moneys so invested shall constitute a perpetual fund, the capital of which shall remain forever undiminished, and the interest of which shall be inviolably appropriated, by each State which may take and claim the benefit of this act, to the endowment, support and maintenance of at least one college, where the *leading* object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the Legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life."

The course of study is exceedingly liberal. While those branches of learning intimately connected with agriculture and industrial arts, with military tactics are expressly enjoined, other scientific and classical studies are not excluded. Thus it may be an institution where an education, both special and comprehensive, can be obtained. It combines the theoretical and practical, the intellectual and physical. "It furnishes the means of a positive increase of human knowledge in the departments bearing on agriculture and manufactures, and the medium of teaching, not only farmers, but those who shall become teachers and improvers of the art of farming." Here all the sons of Maine may seek that preparatory discipline required to fit them for all the diversified occupations of life. Here, by the military drill, and by labor on the farm, they may attain that physical strength and development so essential to vigorous health, energy and success in any pursuit.

This provision for physical education is one of the most impor-

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tant features of the bill. In our haste to develope the mind we have forgotten the body. The one has been constantly forced by a kind of hot-bed process, while the other has been neglected or cramped in all its powers, and so we are dying for want of physical culture. It is the great American want. The National Government now offers the military drill and prescribes instruction in military tactics.

If such discipline and knowledge had generally been imparted, the present war would not have found us all unprepared. It might have been prosecuted more successfully, terminated more speedily, and saved millions of money and thousands of lives.

The errors of the past are irremediable. The present and future can only be molded by our influence. The time has not yet come to deprecate the military spirit. The lion has not yet shown any disposition to lie down peaceably with the lamb, hence we cannot safely turn the swords into plowshares or the spears into pruning hooks, however desirable such a consummation may be to agriculture, but we must, at least for the present, be a nation of soldiers or give up our liberties. Hence, in the proposed institution, ample instruction in military science must be imparted, and all the students required to practice all the exercises the manual of arms directs. This exercise by the military drill, and daily labor upon the farm or in the work-shop, would secure ample physical development and preserve the health, while the mind is intently applied to the acquisition of knowledge, and thus not only would sedentary habits be prevented and the constitution be unimpaired, but the muscles of the body and the faculties of the mind would be strengthened and developed at even pace, the one reacting upon and promoting the vigor of the other, and the whole man would be prepared in the best manner for the arduous duties of subsequent life.

As the National Government has offered to the State such a munificent gift, it devolves on the Legislature to determine whether it will accept it with the annexed terms and conditions. "It is rare that a question of more immediate or more far reaching consequences is submitted to its action."

If it would obtain this bounty, it must provide the college and furnish the necessary buildings. Vast benefits to the age and to the race hang on the decision. The time has already arrived to locate the lands. The acceptance must be signified within two years, and the college must go into operation within five years from July 2d, 1862. A measure of such intrinsic importance, both present and prospective, must receive the favorable consideration of the Legislature. It cannot afford to refuse a donation so beneficent.

Assuming, then, that an agricultural college is to be founded, in accordance with the provisions of the act, the questions of location, buildings, departments, &c., must be considered. And while it would be premature at this time to decide upon any fixed definite plan, it may be well to mention some details by way of suggestion, that may properly be considered when arrangements are made to put the college into operation, with the hope that they may serve as a ground work upon which others may rear a more finished structure.

Instead of connecting it with some classical institution already established for another purpose, and making the agricultural subordinate to the literary department, it ought to be located entirely independent of any other school, in some place which is central in respect to geographical position, population and social advantages, where enough land comprising the greatest possible variety of soil susceptible of improvement by cultivation, can be obtained to constitute a suitable farm.

The *farm* is indispensable. It is the most appropriate arena to impart and illustrate important lessons, to interrogate nature, witness all her processes and operations and gain valuable instruction. By means of it the principles of science can be directly applied to agricultural operations, so that by the union of science and experiment, the results produced will indicate the precise practical value of these principles, and aid the student to obtain a correct knowledge of the best and most profitable methods of cultivating and managing a farm. He will institute experiments to test disputed modes of culture, to ascertain the adaptation of our climate and certain soils to particular crops of desirable plants, the fertilizing properties of various manures, and will determine other questions of vast importance, requiring accurate and methodical investigation. And an annual report is required to be made of the progress of each college, recording any improvements and experiments made on the farm, with their costs and results, and such other matters as may be supposed to be useful, and a copy sent to all the other colleges, so that each may be the recipient of the knowledge attained by all the others.

A suitable building should be provided containing lecture and recitation rooms, library, laboratory, room for the various departments of Natural History, with accommodations, at first, for some one hundred students, so planned that it can easily be enlarged or extended, when necessary, by the addition of wings.

The library, chemical and philosophical apparatus, the instruments for surveying and leveling, mensuration and drawing, the different kinds of woods, and models of fruit might be gradually collected as they are needed. Our Scientific Survey might furnish specimens of the botany, mineralogy and geology of the State, to which additions may afterwards be made.

A model barn is needed, with apartments for all the various uses of the farm. The live stock should be such as the different branches of husbandry require, and ought to include thorough bred animals, or specimens of all improved breeds that their merits and characteristics may be observed and ascertained.

In the proposed institution the various departments of instruction will include :

1st, Practical Husbandry.

2d, General and Agricultural Chemistry.

3d, Botany, Vegetable Physiology and Horticulture.

4th, Zoology, Animal Physiology and Entomology.

5th, Geology, Mineralogy and Meteorology.

6th, Mathematics, Surveying, Engineering and Mechanics.

The Superintendent ought to be a thorough practical agriculturist, one who will not simply travel in the monotonous routine of the dead past, but believes in science and progress, and is prompt to avail himself of any improvements, and has that peculiar tact and judgment and intelligence that shall qualify him to oversee and direct the labors of others.

He will require all the students to work on the farm or in the gardens some three hours daily, to become acquainted with all the details of practical husbandry, to use the various tools with their own hands, and perform all kinds of work required in the management of the farm and stock. He will teach them *how* to dig, to plow, to plant, to hoe, to drain, &c., in the best manner, while the Professors of the college will enable them to understand exactly *why* each is to be done, or the reasons for the operations, so that labor may be applied to the best possible advantage.

Some five Professors will be required of the highest natural and acquired talents, each devoting himself specially to one of the departments of science and thoroughly exhibiting all its relations to Agriculture and the Mechanic Arts.

The annual revenue derived from the national bounty will pay the salaries of all the professors needed to instruct the several classes. It will also secure occasional or regular courses of lectures from the most eminent scientific men of the country, not connected with the college. Indeed, if economically expended, it will defray all the expenses except those incurred for the erection of the buildings. For these the State must provide, assisted, perhaps, by private benefactions. It is asked to expend a few thousand dollars with the certainty of realizing millions in the increased intelligence and consequent advancement of agricultural and all kindred industrial pursuits.

It will then provide a school whose doors will ever stand open to all who have obtained the necessary preliminary knowledge. No time need be expended in the attainment of any branch of learning, not having a close relation to practical pursuits.

The college will drill them some four years, and will then bestow its honors by conferring a degree of Bachelor of Science, as honorable, as useful, as any title ever bestowed by man; or it will allow those whose time and means do not permit such protracted study, to select those branches more closely related to their future business.

The Department of Chemistry will comprise instruction in respect to chemical forces, laws of combinations, properties of bodies, the facts and phenomena belonging to Inorganic and Organic Chemistry, all being amply illustrated by experiments. In Analytical Chemistry instruction will be imparted in respect to the analysis of soils, minerals and preparation of artificial manures.

In the prosecution of this analysis, the student must have daily practice in the laboratory, applying with his own hands the tests required to ascertain the composition and properties of bodies, thus securing a practical knowledge of the methods employed in these investigations.

Agricultural Chemistry will be principally taught by lectures, illustrated on the farm as well as in the laboratory, whenever the subject will permit, on the formation and composition of soils, composition of plants as determining the chemical condition of the soil, composition of the air, and its relations to vegetable growth, connection of heat, light and electricity with the growth of plants, nature and sources of the food of plants, chemical changes attending vegetable growth, chemistry of the various processes of the farm, as plowing, draining, &c., exhaustion of soils, and methods of chemically improving them, by mineral, vegetable and animal manures, and by indirect methods, rotation of crops, chemical composition of various crops and their uses as food, feeding, housing and care of stock, the chemistry of the dairy, nutritive and fattening qualities of the different articles of food and its preparation for animals and man.

In Botany, the student must first become intimately acquainted with structural and physiological botany with the aid of living and dried specimens, diagrams, and microscopes for the examination of minute structure. He then may proceed to the investigation of systematic botany, by dissecting and inspecting a sufficient number of our native plants to become acquainted with the more important natural families.

A Botanical Garden, containing specimens of every tree, shrub and plant, which will endure the climate, and an ample Herbarium would greatly assist in obtaining a knowledge of this science. The relations of botany to Horticultural operations, and the principles concerned in those operations can be intelligently explained and comprehended in the gardens and grounds.

There the student can have abundant practice in propagating plants from seeds, in budding, layering and grafting. He may also by cross breeding obtain new varieties of fruits, by removing the anthers from the blossom of one tree, and dusting upon its pistil pollen from the stamens of the flower from another tree, and subsequently planting the seeds obtained from the resulting fruits. In this way many new and desirable fruits, ornamental shrubs and flowers have been obtained. This is only one of the many applications of science.

Zoology and Animal Physiology. Instruction in this department would consist of recitations and lectures, illustrated as far as practicable by specimens of native and foreign animals, diagrams, by dissections of animals, and inspection of minute structure by the microscope, to make the student familiar with the appearance and relations of the various organs of the system in health, and the changes produced by disease. He may be led to the investigation of the Anatomy and Physiology of the organs of locomotion, digestion, circulation, respiration and reproduction; the systematic arrangement of animals in classes, families, &c., their habits, the Natural History of domestic animals, including the characteristics and peculiarities of different breeds and their value for particular purposes; the history and habits of the Insects injurious to vegetation, and the means of obviating and lessening their ravages, with the birds, reptiles and parasites which destroy them. He will study the economy of domestic animals, including the principles of breeding, rearing, and management; the diseases of animals, their nature and treatment, and the mode of administering medicines.

Geology, Mineralogy, and Meteorology. By recitations properly illustrated, and by familiar lectures on the relation of these sciences to agriculture, the student learns how all soils were originally rock, and have been gradually produced by its abrasion, disintegration and decomposition to form the great seed-beds of the world; how some seven or eight of the four hundred and thirty-four kinds of minerals constitute nineteen-twentieths of the whole crust of the earth, of which quartz, which gives strength to the stems of all grains and grasses, constitutes alone, nearly one-half. By studying the geological strata, those broad leaves of the book of nature, he learns where to find valuable quarries, minerals and manures; and discerns at a glance the agricultural capacities of any particular section for valuable plants and trees.

As all plants derive a great part of their sustenance from the atmosphere, a knowledge of those forces of nature which affect their growth comprehended under the term of Meteorology is of great utility. By it the student ascertains that the agricultural capacities of a country depend upon its climate and moisture as well as upon its soils; that soils differ greatly in their power to absorb and radiate heat from the sun, as also in their ability to absorb and retain rain and dew, according to their geological structure and state of cultivation, and thus affect the climate; also that distance from the equator, elevation and distance from the ocean, the currents of the Gulf stream, the prevailing direction of the winds greatly influence the temperature and the amount of moisture. Having learned these lessons and the mean temperature of any region by long observations, the farmer is taught to adapt his crops to it. Even if the season is too short to bring any plant to perfection, he may overcome the difficulty by preparing the soil by drainage for the earlier reception of the seed, and forcing its growth by stimulating manures; or if a summer drowth is apprehended, its deleterious effects may be avoided by the earliest possible planting and by deep tillage, so that the crops may be well rooted and grown before the soil becomes dry.

Mathematics, Surveying, Engineering and Mechanics. This department would involve instruction in algebra, geometry, trigonometry and conic sections applied to surveying, leveling, topographical surveying and plotting, with the use of compass, level and other instruments in the field; in mechanics and engineering especially as applied to agricultural machinery and processes, to rural architecture, arches, framing, road making, bridge building, etc., with drawing and design.

In the course of instruction, declamation, composition and debating would be included; and it is extremely desirable to add all those branches that are most closely allied to manufactures and commerce, and thus afford an education to the sons of our mechanics and merchants as well as the farmer.

Although we deem it inexpedient now to determine upon any fixed definite plan, for which ample time is allowed, yet we entertain no doubt that the very terms of the act donating the lands indicate an institution entirely distinct and radically different from any other heretofore founded in the State; for had it contemplated or desired its connection with any other schools, the grant would have doubtless been expressly made for the purpose of increasing the facilities of those already in operation.

It is also equally clear that a scientific education will as effectually prepare our young men for practical life, as a classical training would qualify them for literary pursuits or professional life. Hence there is no necessary connection between the two systems, and it is sufficiently obvious that an independent college was designed. We therefore append to this report a series of resolutions which comprehend the leading features indicated by the act or which are palpably necessary in themselves.

As we look through the long perspective aisles of the future, we catch a glimpse of a coming golden age; when every branch of natural science, every art, every weapon of obsolete warfare, shall contribute to bring the art of agriculture to perfection; when our vast area shall become one great, fertile garden, teeming with busy manufacturing villages and cities, and our keels shall plough every sea, transporting our surplus materials, enhanced in value by the cunning fingers of our artisans and exchanging them for the products of more favored climes. It is now in our power to hasten a consummation so devoutly to be wished, by promoting scientific education and diffusing intelligence, so that Maine, in accordance with her proud motto, shall take the lead in the onward career of progress and improvement.

Resolved, That the Board of Agriculture respectfully and earnestly recommend to the Legislature the early acceptance of the grant of public lands tendered by act of Congress, in aid of agricultural and mechanical education.

Resolved, That the fund arising from this grant will not be, in the opinion of this Board, more than sufficient for the suitable endowment of *one* efficient school of the kind contemplated.

Resolved, That the college indicated by the act of Congress above mentioned, is essentially unlike either of the existing colleges in the State, they being properly *literary* institutions, while this should be primarily designed and purposely adapted for the education and training of pupils for *industrial pursuits* in after life.

Resolved, That such a school should not be incorporated with any of the existing literary institutions of the State ; because they are designed for, and are adapted to, a different style of education and training, and also because a liability would thereby be incurred of an overshadowing influence from, or of ultimate absorption into, the institution to which it is attached.

Resolved, That an industrial college should possess as a part of its apparatus, a farm and a work-shop which are as indispensable for practical instruction as philosophical or chemical apparatus is for scientific instruction. And the farm should embrace such a variety of soils and of surface as should constitute it, as near as may be, a fair epitome of the State.

Resolved, That the school should occupy a location easily accessible, and as nearly central to the State as may be, considering both geographical position, population and social and other advantages.

The above resolves were the occasion of protracted and animated debate and were unanimously adopted.

Mr. Chamberlain, for the Committee to whom was referred the Second Topic, viz: "What action shall be taken under the provisions of law authorizing the Board of Agriculture to prescribe for what objects or purposes a portion of the State bounty shall be offered in premiums," presented the following Report:

This question is predicated on section fourteen of the act approved March 19, 1862, in the following words: "Every society which receives bounty from the State, shall award in each year, by way of premiums or gratuities, or shall expend for the purchase of seeds, implements, or breeding animals, a sum not less than the bounty so received, for the encouragement and improvement of agriculture, horticulture or the mechanic arts, and it shall be competent for the Board of Agriculture to direct for what objects and purposes premiums shall be offered to an extent not exceeding one-half the bounty of the State."

To determine whether any action is now called for in the premises, let us look a little into the operations of our agricultural societies to see if any suggestions or directions from the Board would be well timed under the act that thus links the duties of the Board to the active operations of these societies.

In 1859 the twenty-four county societies received from the State $4,590.56, and paid in premiums $6,783.87. Of this sum $3,403, or one-half of the whole, was awarded on live stock. The total amount awarded for grain and root crops was $549.45, or less than one-sixth the sum distributed for the encouragement of improvement in our domestic animals.

In 1861 the total amount of premiums offered by the twenty-seven societies was $10.032. Of this amount, $1,114, or a fraction over one-tenth was for grain and root crops.

In 1862 the amount of premiums offered on grain and root crops fell to $814, of which only $316 was awarded. About one-fifteenth of the money paid by the State to these societies, goes to encourage the production of those crops which make up a large portion of our own sustenance and that of our domestic animals. The general feature of the prize lists, giving prominent encouragement to improvement in our domestic animals, has not changed in the history of the societies; except latterly, much money has been paid for the exhibition of fast horses. We have shown above, that in one year, one-half of all the awards was for live stock—the other half being distributed for the encouragement of general farm improvement, experiments in draining, subsoil plowing, plowing at exhibitions, for reclaiming waste and wet lands, for manures and experiments with them, for orchards and nurseries, and for other special improvements on the farm, for fruit, dairy and other products, for agricultural implements and the encouragement of the mechanic arts.

The time *was* when improvement in the animals on the farm was the great desideratum. A realization of the comparative low condition of Maine in this regard, the magnitude of the undertaking to secure a sure and speedy improvement, and through this means to raise the general character of our husbandry, led to associated efforts, and finally to the construction of our agricultural societies. What was a leading object at the outset would naturally remain such till Anglo Saxon perseverance compassed the end.

Of the paltry sum of $316 paid in the whole State in 1862 for the encouragement of grain and root culture, how large a portion was probably bestowed for preconcerted and carefully conducted experiments aiming at discoveries in general laws, and the establishment of facts for our future guidance?

The peculiar and unfortunate condition of affairs in our country, prompts us to put forth new efforts; and wherever mental or physical force has hitherto laid dormant, every patriotic impulse dictates that it shall now be made available for the common weal.

In whatever channel our agricultural societies may have directed their efforts, with good results, it is foreign to our intention to divert those efforts to the detriment of any special interest. It might seem an unfavorable time to urge any material change from the "mixed husbandry" hitherto prevailing, to that course of practice indicated by the Secretary in his recent reports, whenever new products are proposed and a wider range in practice naturally suggested.

The State policy in the aid extended to agricultural societies, is a compensating policy. The property of the State—the cash in its treasury—is exchanged through the agency of these societies, for products coming through *human brains*, in the shape of valuable knowledge, to be applied to the production of material wealth, and ultimately the restoration of the cash to the treasury with large increase. Whether the return be immediate or through a longer cycle, is not material. We do not question the soundness of the State policy in this regard. Men do possess brains enough, and may grasp knowledge enough to make farming and mechanical pursuits both intellectual and interesting. The expansion of the soul, the interior growth is not necessarily cramped and fettered by being wedded to the soil. We may be educated to a love of nature, so as to appreciate her daily surroundings, and to delight in searching to know her laws. Every crop raised on our farms may be made an exceedingly interesting experiment.

Intellect is dulled by excessive physical labor, and now when men are scarce, farm arrangements should be perfected so as to economize strength. Mind should quicken—thus extending the long arm of the lever at which we stand to do our work.

Applying these thoughts to the matter in hand, we are forced to the conclusion that at present an undue proportion of the money bestowed in premiums, is awarded on live stock. The statements accompanying the presentation of stock at our exhibitions, are, in the aggregate, of little value. The intrinsic worth of the animal itself is a sufficient incentive to the careful farmer to select from the best breeds within his reach ; and the proof is entirely wanting, that the continuous payment of premiums has not latterly effected anything for the introduction of new and better breeds, anything for instituting comparisons between different breeds, by sufficient data, to settle questions of preference for specific purposes, or even to determine the general question of profit or loss.

In another direction there are unexplored fields that we approach with much curiosity, where the border of the veil of obscuration is but just raised by science, where we are invited to step in and pursue our investigations and gratify curiosity by experiment alone—the fields of vegetable life—the crops of the farm. Here, even, where we all are anxious to know more, where we all confess ourselves but children, we are gaining, year by year, but little knowledge.

The prize lists of the societies name a mere pittance for premiums, for the reason that so few of them are applied for. They are not competed for because they are so small. They hold out no inducement in compensation for the time required in conducting anything like a careful experiment.

An acre of wheat is grown on one of Maine's verdant hill tops. Its yield is thirty-fold. Mother nature was propitious. The early and latter rain descended gently. Insect life in its neighborhood did not appropriate it. The straw grew tall and strong and bright.

Besides the elements of its structure supplied from the atmosphere, carbon, hydrogen, oxygen and nitrogen, it *chanced* to find in the soil, and which it appropriated, about one hundred and eight pounds of soluble silica, thirteen pounds phosphoric acid, nineteen pounds potash, eight pounds lime, and a less quantity of sulphuric acid and magnesia.

The grain was full and fine, for besides its atmospheric elements, it chanced to find within the range of the roots, silica, phosphoric acid, sulphuric acid, lime, magnesia, peroxide of iron, potash and soda.

We find in our book of record, that this crop was a premium crop; and we are informed that the ground was plowed and harrowed previous to being sown. How much more than this simple announcement, do the great bulk of the returned "statements" required by law, contain?

A crop of potatoes is a very exhausting one, when the tops and tubers are entirely removed from the soil. A large crop takes more than four hundred pounds of incombustible matter from an acre, more than half of which is potash. Turnips, mangolds and carrots abstract from four hundred to six hundred and fifty pounds of inorganic matter, about one-half of which is potash and soda. But what is worthy of consideration, is the fact, that these crops may be extended very much beyond our present practice, and all be consumed at home with great advantage, thus returning to the soil the precious mineral elements taken from it and with them a great deal more of fertilizing substances obtained by these crops from other sources.

The most successful husbandry in the world, as proved in grain products and an increased fertility of soil, deals in vast quantities of roots, and this mainly with a view to increase the stock of manure on the farm.

The opinion of your Committee remains the same as when expressed on former occasions—that if stock husbandry is to receive special attention—if the number and value of our domestic animals shall be increased, if we are to produce more meat, milk, wool and bread, it must come mainly through the increased production of roots in a well considered rotation. This matter is vastly suggestive of thought, but we abstain from extended remarks, feeling our incompetency even to attempt the giving directions or even advice to such a people as our constituents, where matters of such magnitude are pending. We will simply name the objects for which it seems to us desirable that increased encouragement should be given at the present time: 1st, cheese-making. 2d, orchards and nurseries. 3d, wheat and corn culture. 4th, root crops. And we respectfully submit the following preambles and resolutions:

Whereas, it is the opinion of the Board that Dairy Husbandry has not received that attention in this State that it claims in consideration of our inherent advantages and capabilities for the manufacture of cheese and butter; and whereas, from the information communicated in the last Report of our Secretary in respect to the most approved modes of practice in the principal dairy regions of the country, it is believed that cheese of uniformly good quality may be manufactured in Maine; therefore

Resolved, That we recommend to the several Agricultural Societies to devote such portion of the bounty of the State, as their several circumstances may seem to require, to premiums for the best conducted and fully reported experiments in making cheese and butter.

Whereas, it is the opinion of the Board that the climatic and other influences in the last few years, causing a decline in the number and condition of our fruit trees, may not again operate for a long series of years, and should not discourage us, nor weaken our efforts to become large exporters of fruit; and whereas, it is desirable that the trees required for the extension of our orchards should be produced at home; therefore

Resolved, That we recommend to the societies to offer premiums, to be awarded at the end of two, three or more years, for best and most fully reported experiments in renovating and improving orchards now existing, and for the setting and culture of new ones, and also for the rearing of nurseries embracing such varieties of apples, pears, plums and small fruits as are approved for the several localities.

Whereas, the most of our lands that have long been cleared of wood, fail to produce a remunerating crop of wheat or corn, except they be carefully worked and liberally fed; and whereas, maximum crops cannot be expected till we have learned much more than we now know concerning the demands our crops make on us in the preparation of their seed-beds, and more in respect to the best ways and means to supply those demands; and whereas, more light and knowledge in this interesting field of inquiry can only be expected through further experiments; therefore

Resolved, That we recommend the offering of liberal premiums for the best conducted experiments in the culture of wheat and corn.

Whereas, it is the opinion of the Board, that the root crops have not received that attention, in the "mixed husbandry" prevalent in the State, that their value and importance demand; and whereas, it has been demonstrated that the art of agriculture in its highest condition deals very largely in these crops; and whereas, it is desirable that when change shall be effected in our practice, it shall be such that an increase in the fertility of our soils shall legitimately follow; therefore

Resolved, That we recommend to the societies to offer increased premiums for the best conducted experiments in the culture of potatoes, carrots, mangolds, parsnips and turnips.

Resolved, That the several Agricultural Societies *be directed* to offer not less than one-fourth of the State bounty annually received by each, in premiums upon *crops,* either of grains or of roots, and that premiums be offered for the *largest crops grown at least cost.*

Mr. Percival, from the Committee upon the Third Topic, reported as follows:

The Committee to whom was assigned the following subject—"What unusual demands on the farmers of Maine grow out of the present condition and prospects of our country?"—met in council, considered and discussed in a careful manner the subject, but before committing our conclusions to paper in the form of a report, we glanced over the last Annual Report of our Secretary, just laid on our table, and there (on page 44) we found a report on the same subject, in which this matter is fully and ably treated. Many important and valuable considerations and suggestions are given, and it seemed to us that nearly everything was there said that the subject demanded, leaving little for us to do but to call attention to that report.

On page 211 of our Secretary's Report, he has summed up the whole matter, finished up what he did not say in his former one. He there forcibly and properly reminds us that the last call for men for our army took a large proportion of the men from the producing classes. That help which the farmer must have, will, in the nature of things, be scarce and dear; therefore, the necessity of early and well matured plans, unusual care in the economy of our time, and of bringing to our aid all the appliances within reach, in the way of improved labor-saving implements and machinery.

He has also reminded us that while there are many less hands to perform the labor of the farm, there are few less mouths to feed, or bodies to clothe, therefore, we need to manufacture and economise in every possible manner, every fertilizing material, and apply it in such a way, and to such crops as are most needed, and will give the largest and most profitable return, and also that we shall encourage and sustain all those organizations and institutions that tend to elevate and improve the calling we represent. Your Committee cordially and heartily endorse all our Secretary there says as to our "duties and prospects."

In the report before mentioned, it was urged that more attention be given to sheep husbandry. The result has already proved the sagacity of that recommendation. The price of sheep and wool have seldom, if ever, been higher than now, and must continue to be high for some time to come; and we recommend to the farmers to continue to improve and increase his flocks, and at the same time to look about him and learn if possible if there are not some crops that may be more cheaply and easily cultivated, that will supply the deficiency of short pastures. We recommend for this purpose the English turnip for early fall feeding; and for winter the Swede or Rutabaga, the Lupine, the California Pea, and the Vetch or Tare.

One of the characteristics of the Yankee farmer is to run into extremes; and while we recommend him to increase his flocks in all prudent ways, we would caution him against doing it to the neglect of other important interests.

Heretofore a large proportion of the exports from our State have consisted of beef, neat cattle, and horses, which your Committee believe have never paid so large remunerative prices as wool at its lowest point. Yet it is not prudent for us to abandon the raising of neat stock and horses, and give our attention exclusively to sheep. The raising of good horses has always paid the farmer. Our Secretary has, in the report just issued, demonstrated satisfactorily to our minds that we may profitably become larger manufacturers of dairy products: and we must have good cows, and oxen to do our work and make our beef. It is only the thousands of miserable and worthless animals that have never half paid for

COTSWOLD BUCK "DR. KANE."

Bred by G. C. Hitchcock, New Preston, Conn. Sired by "Cedric." Now owned by Charles Corliss of "Poplar Lawn," Haverhill, Mass.

the care and cost of raising, that we would have to give place to sheep, or some animal that will pay.

No pains or reasonable expense should be spared to improve our neat stock. Much, very much has already been done, and yet there is abundant room for more, and without any great outlay of money, but simply by a careful selection of our best cows, and breeding to such improved and thorough-bred bulls as we may have in our State.

The past has been a fruitful season. Nearly all our crops have yielded abundantly, especially so is it with the grain crops, which are now bringing unusually high prices, particularly barley and oats. And here again is a demand on the farmers, not to get excited by these high prices, and rush into the growing an unusually large breadth of these grains to the neglect of other crops, without first considering whether the circumstances which induced this state of things may continue any great length of time.

The high price of many farm products, and indeed of almost everything in the country, has created a sort of speculative mania in the land; and there is danger that the farmer, in his eagerness to become suddenly rich or to accumulate money more rapidly, may invest his hard earnings in some outside enterprise of doubtful utility, or in stock that may or may not pay, instead of the legitimate one of improving his flocks, herds and farms, or supplying himself with better farm implements, which never fail to pay a large per cent. on the investment. On the whole, your Committee do not see that there are any *new demands* made on us as *farmers* by the unfortunate condition of our country, but that those already existing are intensified. But we are to remember while straining every nerve to add to our own and the wealth of the country, the other and higher demands upon us as citizens.

Mr. Wasson, for Committee on Fourth Topic, reported as follows:

Protection of Sheep Husbandry.

The Committee having this Topic under consideration, submit the following:

For a succession of years the farmers of Maine, through the medium of the Board of Agriculture, have come to the capitol, as regularly as the Mussulmen assembled at Mecca, to invoke legislative aid and protection in behalf of the interests of sheep husbandry. The natural advantages of the State—and none other is better adapted to sheep husbandry of a high character than Maine—have been earnestly and faithfully portrayed and presented. The causes which make sheep raising both unremunerative and hazardous, have been as fully and as truthfully explained. Those *canine* causes still continue like "war risks" to *eat* up the profits. The essence of legislative interference has been too much like British neutrality.

Every man has the right to claim from the government under which he lives, protection in the enjoyment of his property. That right has been exercised, and that protection has been claimed, at the hands of those who have been called to preside over the political and economical interests of the State. The assumption has been unimpeachably established and shown beyond denial, by the farmers of the State, that the losses from wild animals, disease and accident, are not equivalent to the losses from the depredations of dogs. Facts and figures multiplied to an almost unlimited extent testify to the truth of the assertion. Supplications, remonstrances and petitions, have failed to induce the Legislature to abate the grievance or remove the aggressors.

Cotton, the great source of supply for the textile fabrics of the world, being cut off by the rebellion, woolen fabrics for a long time must take the place of many for which cotton has hitherto been considered essential. We have never grown wool enough to meet the home demand, even when cotton was accessible; and the entire policy of our State has been of a character to diminish rather than increase the growth of this product. In proof of this, is cited the "act" of last winter, taxing dogs, provided *the several towns shall agree thereto*, a proviso without precedent or parallel in the whole history of taxation.

No elaborate report is required to vindicate the importance of our cause, or the justness of our claims. The extraordinary circumstances by which we are surrounded, afford no new argument in favor of the protection of sheep husbandry. And again we ask of the Legislature such protection for this important branch of our industry as the case demands. We herewith submit the following resolution:

Resolved, That the interests of the State, demand at the hands of the Legislature, protection to sheep husbandry.

The Resolve was unanimously adopted.

Mr. Percival, for the Committee to whom was referred the Fifth Topic, Viz: "How has the introduction of thorough-bred animals affected the milking properties of our cows," submitted the following Report:

No data can be obtained by which definite conclusions can be arrived at on this question, and we can only give our opinion in the matter and a few reasons for "the faith that is in us." In our judgment this introduction has produced a very beneficial effect on our dairy stock. We do not deny that there have been and now are many good and some extraordinarily good dairy cows amongst what are termed natives. But that as a class, on the whole, they are as good as the thoroughbreds or grades, we deny. The Herefords have not seemed to improve the dairy qualities of the animals with which they have been crossed, and we are not aware that any great merit is claimed for them in this respect, and yet we believe their introduction beneficial. The Durhams have been longer in our State, and consequently have been the greater means of improvement than any other breeds introduced. We believe their grades have almost uniformly surpassed the original native stock and often the thoroughbreds in this respect.

On searching for reports of celebrated cows, we have found them as five to one in favor of the grades of this breed over the native; and so of the Ayrshire. The Devons, although not having been bred with us with much reference to their dairy properties, have improved upon the natives, if not in quantity, certainly in the quality of their milk. The Jerseys are a new breed with us, but from what we know of them, we have no doubt their introduction has done us good.

In consultation with Amasa Stetson, Esq., who was for many years largely and successfully engaged in manufacturing butter for the Bangor market, in the town of Stetson, keeping from forty to sixty cows, he informed me that he found grade Durhams the most profitable cows he could keep. This is in accordance with my own experience, having owned a grade cow, of medium size, that yielded, in twenty-eight days, 57½ lbs. butter—16½ lbs. being her largest yield in one week—on good grass feed alone, which was quite equal to the celebrated Oak's cow, whose largest yield was 19½ lbs. in one week, when she was largely fed on meal. One of this cow's progeny, sired by an Ayrshire bull, has proved quite equal to her dam. Any quantity of instances can be given of grade Durhams and Ayrshires of superior milking qualities.

Before the introduction of foreign animals, but little attention was paid to the improvement of neat stock. When Thorougbred Bulls were brought among us and larger prices demanded for their use, the attention of the farmer was called to the subject—comparisons were made between these animals and only the best selected for crossing. It not only led to more careful selections in breeding but to more generous care and treatment in the way of warm barns and better feed.

Much has already been accomplished, and yet there is abundant room for further improvement in this direction. We cannot have grade animals without thoroughbreds. We believe that as much depends upon having bulls from good dairy ancestry as cows, and as it is a fact that there is a great difference in families of the different breeds as to their dairy qualities; if butter and cheese is the desired object, we advise the purchase and use of only such animals as have been bred to this point.

Mr. Chamberlain, for the Committee on the subject of Manures, reported as follows:

New and Increased Fertilizers.

We take the liberty to join to our topic as expressed in its widest application, the same thing, only clipped a little, which was assigned us for consideration in the last interim.

We couple them for the reason that we have now only time to treat the subject with extreme brevity. Our topic, then, contemplates the inquiry whether we have availed ourselves of all those substances within our reach recognized as fertilizers, and to the extent that it may be applied with good results.

Chemistry teaches that sixty-four primary elements, (so far as at present known,) enter into the composition of soils and go to build up the structure of vegetable and animal organisms.

A chemical analysis detects certain elements in plants; the plants get them from the soil. If the soil is deficient in them they must be supplied; and for this supply we procure such elements as were previously derived from the soil, or we get them otherwise from nature's great storehouses.

The principle involved in this simple cycle is the basis of the art and science of manuring crops. When these principles were first perceived, scientific men predicted a sure and swift development of the art of agriculture. But science is a materialist. It stops short where the natural elements are merged into life.

Science, whis is a name for exact knowledge of facts and principles, of effects and their causes, and is obtained by the observation and experience of many observers, has rendered us essential service through chemical research, but it leaves us to explore the most interesting field, the world of life, without aid from chemistry proper.

Fertilizers are divided into two great classes, viz: Inorganic, or Mineral, and Organic, or Vegetable and Animal products.

The inorganic fertilizers most known in this State, are lime, plaster, wood ashes, phosphate of lime, and salt. All these with the single exception of wood ashes are enhanced in price in most localities by a cost of transportation. The value and importance of each is now generally appreciated. Salt, in all places removed from the ocean, is a valuable fertilizer when applied in small quantities to grass as well as to all cultivated crops and garden vegetables, particularly to mangolds, asparagus and cabbage, it is thought to be highly beneficial. It is an essential aid in the compost heap.

All salt found damaged in our marts of trade and in the fisheries, should be saved for the soil. Wood ashes can now be had in very small quantity compared with the demand.

Our granitic and sienitic rocks contain about the same percentage of potash as wood ashes. They also contain lime as well as other elements found in all fertile soils, but they are locked up from our use. Regardless of any peculiar theories which may have been broached regarding it, we would like to see an extended experiment with granite heated and reduced to powder.

From some experiments made under our own observation, we have a strong faith in it as a valuable amendment to any soil. In all places where these rocks and wood abound, they can be reduced at a moderate cost. It may prove to bear the cost of preparation and transport as well as plaster.

In the class of *organic manures*, vegetable and animal, and their mixtures, we include the waste portions of all our cultivated crops, the natural vegetation of the country, such as the grasses and weeds, the leaves of trees, marine vegetation, animal excrement, fishes, the flesh of animals, hoofs, hair, skins and blood. We have all had a degree of practical education in saving and applying this class of fertilizers.

We need not look beyond our own immediate neigbborhoods to see the most reckless waste of many of these precious substances.

The life-giving elements are being drained from our farms and are borne on the current of every rivulet and creek that flows near our factories, tanneries, and slaughter-houses,—to say nothing of the rivers of drainage from our cities—all bearing to old ocean, the very foundation of our material prosperity, while scarcely an effort is put forth to dam up and divert any of these streams.

As an illustration of waste,—on one occasion one of your Committee bought a quantity of manure under the name of *superphosphate of lime,* at a cost of over fifty dollars per ton—which proved a good investment—and the article was made up with a large percentage of tanner's waste.

At the same time two tanneries were in operation within a mile of our land, so constructed and worked, that all the waste was "sluiced" into the river. In a single instance, with much difficulty, we obtained a few bushels of "fleshings," from a lot of "slaughter hides," for a compost heap. And these mills still work on, like nearly all the larger tanneries in the State, year after year, with thousands and millions of our industrial capital running to waste through their hungry maws.

The value of marine manures, to which the attention of those farmers not directly upon the coast has recently been directed, proves to be considerable ; and it becomes an important question, to be solved as soon as possible, what can we afford to pay for *fish guano* at our gates.

Of the many waste substances of the farm that are valuable fertilizers, and which are more frequently suffered to be wasted, we can now only mention,—*First,* Soap Suds. This is a most grateful application, to be made at any season of the year to the surface of any lands about the house that are required to contribute to our pleasure or our sustenance through the vegetation they sustain, whether it be the lawn, the flower border, the vegetable garden, vines, shrubbery or fruit trees. *Second,* Bones. These are now receiving increased attention, since farmers have discovered that their cows are suffering from the lack of soluble phosphate of lime in the soil of the pasture and the hay field, and consequently a deficiency of that sustenance in the grasses. It has been carried off in the formation of milk and bones, and very little of it has been returned.

To supply the cow in her extreme necessity, her owner gives her bone-meal. The better way is to feed the soil. We who have had a care in this direction, do not see a diligent cow losing an hour of precious time on a summer morning, chewing a bone for the morsel of phosphate she may detach from its surface.

Many now save all the bones and throw them into a tub with moist ashes, where they become decomposed and made ready for use as a fertilizer. But the larger portion of the soluble phosphates from our farms goes beyond our reach, in our stock, milk, and crops sold. The bones that accumulate with our consuming population are mostly sold to go abroad—lost to the State.

Finally, as we are forced to stop at a point not very far from whence we started, we only add that we need several bone mills, to encourage a general gathering of old bones, and to entirely arrest all export of that substance.

We want to see *marine manures*, in long trains, moving inland over all the lines of conveyance, till it reaches every farm.

We want to see every man and woman more awake to the importance of improved habits in saving and applying plant food. To awaken interest in this direction is to do good.

Mr. Pratt, for Committee, presented the following Report on

Fruit Culture.

There may be other questions of more importance to the farmers of Maine than the cultivation of fruit, but certainly it is one of the most important and is deserving of much more attention than has been paid to it by the farmers of Maine generally. The consideration of fruit opens so wide a field for investigation, embracing as it does the apple, pear, plum, cherry, and all the smaller fruits, (the cultivation of which is almost entirely neglected by the farmers of Maine,) that your Committee have been compelled to narrow down their investigation to that of the apple. The apple without doubt stands at the head of the list of fruits both in point of usefulness and profit; yet many orchards are going to decay which might with trifling expense be made a source of profit. Few efforts comparatively are being made to rear new orchards or to resuscitate old ones, a fact which every one who has the welfare of our State at heart must deeply deplore. If we attempt to discover the causes which have led to this state of things we shall find them to be various, and differing in different localities.

One of the principal causes of discouragement in putting out new orchards has been brought about by the purchase of miserable, worthless trees from parties out of the State, instead of buying of nurserymen here, of whom we have a plenty of honest and reliable men. Another cause of discouragement is improper location and treatment. Some have planted on flat and heavy soils, without a suitable preparation by underdraining, and the trees have soon become stunted and worthless. Others have planted on rich sandy soils, which has induced a rapid growth of wood, and consequently an early decay. Such orchards while they live will occasionally produce a large crop, but are not to be depended upon. Still another cause of discouragement is to be found in the ravages of the borer.

The first of the above mentioned causes can be overcome by simply purchasing of honest and reliable nurserymen of our own State; or, if one prefers to raise his own trees, by selecting seeds from rugged and vigorous growing varieties, and planting in moderately rich soil, letting them remain until they have attained sufficient size to transplant into the nursery or orchard.

The second may be overcome by planting on high, rocky and moist soils, of which this State furnishes an abundance.

The third and last difficulty is one which is not so well understood generally as either of the others.

There are some localities where this pest of the orchard does little harm, but there are many more where he does work, and cultivators are not aware of it. The jack knife and wire are the best remedies known.

The decay of our old orchards is to be attributed mainly to injudicious pruning, want of nourishment, and perhaps in some measure to a few unfavorable seasons which we have recently had.

The question then arises can they be restored? We answer yes, in a large number of instances; and we cannot better explain how, than by citing an instance which has come under the observation of one member of the Committee. Mr. J. M. Richardson of Androscoggin county, restored such an orchard by simply mulching with brakes to the depth of ten inches, and in some instances the application of a small amount of barn yard manure. Mr. Richardson is more successful than almost any other man in his town in the cultivation of the apple. He mulches his young trees not only to make them vigorous and healthy, but to protect them from mice.*

* If Mr. Richardson finds deep mulching *to prevent* the ravages of mice or vermin, his experience differs very materially from that of some other cultivators.—[Ed.

The importance of giving more attention to the cultivation of the apple, may be shown by the extent to which it enters into our daily food in the shape of sauces, pies, tarts, &c., scarcely a meal being eaten without it in some one of those forms; but it may be still more forcibly impressed by showing how handsomely it fills the pocket of the producer. The County of Franklin in the year 1859, with a population of 20,000, exported $92,000 worth of apples, showing in some measure what may be done in favorable situations. In deciding to what extent we should enter into the cultivation of the apple, we should consider our proximity to market, and the adaptation of our soil to that purpose. In the selection of varieties, those living near large markets may cultivate with profit the summer and fall varieties, while those at a greater distance from market will find it more for their interest to cultivate the winter and spring varieties. We have thus hastily glanced at the subject of fruit culture in Maine, and if any of the ideas here advanced shall be of any practical use to the cultivators of fruit, the object for which this report has been written will have been accomplished.

AGRICULTURAL STATISTICS.

It will be recollected that the Legislature passed an act two years ago requiring assessors to make return to the office of the Secretary of State, of Agricultural Statistics according to the facts as they existed on the first of April in each year. Returns were received the following year from three hundred and fourteen (314) towns and plantations. From one hundred and ninety-one (191) none were received. The requirement being a novel one and its purpose being at first but imperfectly understood, it was hoped that the returns would become more perfect and complete in the future. The hope has not been realized thus far, for during the past season returns were received from only two hundred and thirty-seven (237) towns and plantations, while from two hundred and sixty-eight (268) or more than one-half, none were received. In this state of the case much doubt was felt as to the expediency of bestowing the very considerable time and labor necessary to prepare an abstract for public use. No provision was made by the act itself for any method by which they could be made available to the agricultural community, and if done at all it must be by volunteer and gratuitous labor. The value of statistics depends in the first place upon accuracy and completeness. These are certainly lacking in regard to the last; but their value also depends not less upon uninterrupted continuance during a considerable term of years.

It is this latter consideration, mainly, which induces me here to present the following abstract of the returns—incomplete as they are—for if the plan of collecting them be continued, and its execution be properly improved, even these may furnish a very acceptable contribution to the data from which, hereafter, most valuable practical deductions are to be drawn. For the present we merely remark that an examination and comparison of these with those of last year will exhibit numerous points of interest and furnish many instructive suggestions.

ANDROSCOGGIN COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Durham, . . .	10	218	557	250	274	1275	–	–	–	3745	212	15	201	48	249	6537	223	144	652	13465	23
Greene, . . .	12	204	295	146	148	1216	–	232	–	4750	138	8	273	41	148	4564	1135	165	2144	5091	97
Lisbon, . . .	7	157	329	174	186	675	19	98	113	3620	625	35	183	47	180	2836	423	226	1846	7111	11
Leeds, . . .	20	226	555	408	333	620	230	333	750	5617	68	31	233	60	194	7631	1396	317	3348	8400	136
Poland, . . .	24	348	672	178	256	1359	93	44	83	5917	11	16	231	82	228	10571	1837	1289	2199	11457	68
Webster, . . .	3	201	315	234	181	357	220	245	375	3200	40	–	111	23	145	3493	396	81	3690	3051	–
	76	1154	2723	1390	2078	5482	552	952	1321	26849	1094	105	1232	281	1144	35632	5410	2222	13879	48575	325

ANDROSCOGGIN COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Durham, . . .	26574	214	410	164	1535	2935	1561	–	53715	6822	600	–	–	269	712	244	–	10	15	45
Greene, . . .	17412	2049	574	309	16425	1812	392	–	24542	31472	423	300	29	1210	474	134	–	10	20	50
Lisbon, . . .	14767	2034	395	1072	6408	1893	198	20	35985	1535	390	–	–	2227	593	246	–	7	12	35
Leeds, . . .	21988	884	195	317	13967	2025	1000	120	27950	19120	330	40	93	2931	542	206	–	–	6	22
Poland, . . .	60732	2235	904	241	10665	2863	209	306	74490	9450	1020	166	98	3686	1084	187	2	6	–	40
Webster, . . .	17193	1691	535	308	7321	1543	421	70	28035	1210	62	–	–	1920	509	189	–	1	2	6
	158666	9107	3013	2411	56321	13071	3781	516	244717	69609	2825	506	220	12243	3914	1196	2	34	55	198

CUMBERLAND COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Casco, . . .	17	210	285	146	176	483	–	–	–	1627	–	–	257	27	145	5890	1355	145	88	2624	30
Falmouth, . . .	10	73	440	56	209	425	–	–	–	1534	–	–	236	24	144	4800	250	20	2814	1035	–
Gorham, . . .	17	173	651	122	272	1153	–	–	–	2943	–	–	353	32	374	8483	523	121	5804	6323	54
Gray, . . .	11	154	443	90	159	498	–	–	5	51	1	–	205	42	192	4793	438	343	2265	3367	31
Harrison, . . .	12	240	452	260	206	851	–	–	–	2500	30	25	226	50	220	19500	2400	575	300	5000	40
New Gloucester, . .	20	340	795	142	268	1170	–	–	–	3940	260	25	242	52	235	6320	280	173	1720	4532	37
North Yarmouth, . .	17	96	395	28	116	400	40	100	30	1450	315	20	300	40	200	5000	310	253	2567	3023	37
Otisfield, . . .	11	185	407	197	232	1042	–	–	–	3043	36	54	217	44	162	7854	2672	448	307	4152	128
Raymond, . . .	15	203	283	129	144	661	–	–	–	1880	27	2	135	28	99	4740	1335	161	36	2081	51
Sebago, . . .	6	126	260	141	136	554	–	–	–	1337	22	–	113	29	98	4143	1160	94	–	1048	8
Standish, . . .	8	263	476	131	267	707	–	21	–	2672	187	–	200	43	240	6159	681	405	1215	4194	13
Windham, . . .	17	237	559	64	229	418	49	160	–	3260	3	22	290	34	393	6934	402	72	3835	5987	49
	161	2305	5446	1506	2414	8362	89	281	35	26237	881	146	2774	445	2502	84616	11806	2810	20951	44366	478

CUMBERLAND COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Casco,	14125	645	850	127	6450	960	–	330	28500	3550	560	575	60	1260	747	162	–	–	–	100
Falmouth,	15100	2005	2215	210	3685	3377	75	140	20730	2080	225	–	–	2522	436	78	–	–	–	–
Gorham,	36690	1236	1213	417	21514	4400	216	194	72305	3325	850	27	–	3939	1284	262	–	–	–	–
Gray,	19530	1508	419	352	6985	1555	570	–	31787	2240	310	100	–	940	814	159	–	–	–	–
Harrison,	32526	2000	300	150	10425	2000	175	–	34835	6000	400	30	75	2000	842	200	–	–	–	–
New Gloucester,	24725	1500	600	209	1025	2199	1002	–	26040	7428	109	237	120	1540	430	241	–	–	–	–
North Yarmouth,	6728	1673	573	391	3041	2560	40	152	23673	15675	43	35	–	2685	507	109	–	–	–	–
Otisfield,	24845	1407	306	28	11197	1501	20	317	29693	8090	–	330	128	1532	881	142	6	12	4	50
Raymond,	12297	1241	933	98	7358	904	–	320	30060	854	40	171	–	1281	582	122	–	–	–	–
Sebago,	11089	124	86	–	4319	723	–	262	8122	635	75	204	–	463	492	57	–	–	–	–
Standish,	23441	568	1076	115	61159	1521	465	–	35942	500	65	278	27	5901	846	236	–	1	–	–
Windham,	31112	1196	626	698	10334	2804	163	–	38210	1465	938	25	–	2771	917	209	–	36	–	101
	252308	15103	9197	2795	147482	24504	2726	1715	379897	51838	3615	2012	410	26834	8777	1977	6	49	4	251

FRANKLIN COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Chesterville,	9	214	311	279	171	1706	134	349	257	5158	180	96	131	28	139	3913	1438	197	1794	3622	45
Farmington,	18	688	577	655	447	4000	205	1000	5000	35147	285	175	243	115	480	9095	2604	160	3573	13511	185
Freeman,	11	155	270	161	188	1639	11	23	3041	13692	150	169	86	50	97	1391	2032	123	1756	4422	158
Jay,	20	353	705	700	438	2592	–	–	300	10122	–	1000	250	51	247	6600	1000	300	1500	13200	100
New Sharon,	10	267	466	327	261	1530	199	90	4713	16344	195	220	206	77	252	6089	2250	190	4382	7435	52
New Vineyard,	2	294	200	291	211	6068	–	–	–	15000	75	–	112	43	129	1850	1502	37	1797	4566	–
Rangely,	12	94	105	127	96	1213	10	80	20	4801	81	–	66	38	45	–	5757	85	906	4044	40
Eustis plantation,	5	86	89	100	58	316	–	176	984	4949	87	45	60	15	58	18	747	143	1670	2358	973
Perkins plantation,	3	31	42	29	34	422	–	–	–	1089	9	–	13	7	15	188	551	–	810	867	–
Washington plantation,	2	11	20	13	16	74	–	–	–	250	–	–	7	3	5	160	294	7	298	165	–
	92	2193	2785	2682	1920	19560	559	1718	14315	106552	2762	1705	1174	427	1367	29001	18176	1242	18486	54190	1553

FRANKLIN COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Chesterville,	15253	1018	481	171	10707	1882	116	438	15631	3152	215	118	458	1907	403	69	-	7	-	21
Farmington,	31730	1855	378	174	40034	4833	1465	741	49652	12502	1054	1520	1736	2974	1205	460	-	2	12	30
Freeman,	11165	973	225	47	6243	1857	8	173	11078	1180	510	-	108	599	319	279	12	14	2	30
Jay,	26500	1000	100	350	2600	5000	280	-	3500	7000	2000	200	500	1000	1300	500	-	-	-	-
New Sharon,	22952	2358	298	127	14757	3174	411	482	30075	10135	1399	872	590	2213	1108	247	-	14	18	53
New Vineyard,	7000	565	58	50	8000	2100	-	-	15665	1300	150	-	300	640	240	63	-	-	-	-
Rangely,	2257	141	14	44	-	903	-	-	8090	1600	684	10	-	607	5	32	-	6	10	10
Eustis plantation,,	6315	448	25	28	100	569	251	-	7897	875	-	-	10	531	-	-	-	-	-	-
Perkins plantation,	1680	190	93	18	42	320	12	-	3475	175	-	-	18	120	38	21	-	-	-	-
Washington plantation,	795	-	25	-	320	134	-	-	532	-	-	-	-	2150	18	7	-	-	-	-
	125647	8548	1697	1009	82803	20768	2543	1834	145595	37919	6012	2790	3720	12771	4636	1678	12	37	40	144

HANCOCK COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Brooksville,	15	91	295	138	140	1450	300	–	–	6135	1500	–	63	26	56	200	200	–	3000	500	200
Cranberry Isles,	1	14	43	6	11	233	–	–	–	698	12	–	13	–	3	–	–	–	79	33	–
Eastbrook,	2	45	57	20	45	132	–	–	–	420	158	–	30	9	21	110	154	–	190	617	–
Eden,	7	61	258	45	93	869	–	–	–	3093	328	–	39	23	65	126	240	29	531	259	–
Gouldsborough,	10	35	351	52	139	1113	–	–	–	4212	220	–	67	6	56	40	50	–	150	100	–
Hancock,	8	119	187	60	70	980	7	12	–	2940	339	–	102	21	54	301	337	2	1101	917	17
Mariaville,	3	70	123	36	96	307	–	–	–	966	116	–	20	9	44	169	272	119	65	1152	36
Mount Desert,	2	100	188	28	88	1194	–	–	–	4776	450	–	49	6	35	25	125	–	200	200	2
Orland,	3	200	290	133	139	852	–	–	–	3119	217	–	85	109	87	758	199	23	3280	2850	–
Otis,	6	36	46	15	11	152	–	–	–	430	50	–	23	6	25	115	120	30	90	1021	20
Penobscot,	27	190	372	135	120	1465	–	–	–	4395	632	–	113	40	70	396	215	–	2885	3046	70
Surry,	7	166	230	44	100	1036	–	12	17	3322	436	4	66	18	56	340	236	72	1670	1866	40
Tremont,	10	92	279	100	112	985	–	–	–	2500	184	–	34	10	49	41	237	–	359	–	–
Verona,	6	47	63	30	20	173	–	–	–	559	32	–	44	7	9	19	21	20	222	352	5
No. 33, Middle Division,	1	18	20	12	16	–	–	30	6	129	10	–	21	2	8	–	69	–	218	280	–
	108	1284	2612	854	1180	10941	307	54	23	35694	4084	4	769	492	638	2640	2475	295	14950	13193	390

HANCOCK COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Brooksville, . .	9800	1500	600	300	500	750	240	40	3600	500	400	–	–	1000	250	300	–	–	–	–
Cranberry Isles, . .	1767	100	–	–	–	76	–	–	3075	–	–	–	–	402	–	30	–	–	–	–
Eastbrook, . .	2000	150	75	60	150	78	20	–	3600	500	150	200	50	75	–	–	–	–	–	–
Eden, . . .	6823	845	399	157	280	414	240	5	18058	–	–	–	–	1265	187	121	52	2	–	–
Gouldsborough, . .	2500	700	100	90	40	400	200	25	600	–	–	–	–	100	80	100	50	20	–	75
Hancock, . . .	8656	1480	222	96	1136	615	92	9	23210	50	250	20	–	2176	157	231	19	17	–	–
Mariaville, . .	4844	250	60	78	1419	438	21	–	8091	260	369	–	–	481	155	124	18	8	4	11
Mount Desert, . .	2500	600	150	75	50	650	–	–	1880	–	–	–	–	500	50	100	–	1	–	–
Orland, . . .	13562	1895	1290	265	1310	1466	53	–	27600	700	974	–	–	1876	384	362	–	–	–	100
Otis, . . .	2810	228	103	40	150	219	11	–	6635	–	450	84	–	302	63	96	2	3	–	–
Penobscot, . .	10095	678	100	450	2068	981	100	15	19472	1650	–	–	–	877	698	491	108	–	–	234
Surry, . . .	12756	3868	568	276	504	831	–	2	4624	194	150	14	–	1870	336	376	–	106	20	324
Tremont, . . .	4744	2254	1050	153	–	285	23	–	7963	–	–	–	–	3285	73	74	–	48	–	200
Verona, ...	2742	191	52	78	21	206	–	–	4414	–	8	–	–	304	38	63	–	6	30	18
No. 33, Middle Division, .	1345	28	27	16	286	116	50	–	2150	–	–	–	–	117	39	33	–	–	–	–
	87854	14767	4796	1737	7914	7538	950	96	134970	3854	2751	318	50	13810	2510	2201	249	211	54	962

HANCOCK COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Brooksville,	15	91	295	138	140	1450	300	–	–	6135	1500	–	63	26	56	200	200	–	3000	500	200
Cranberry Isles,	1	14	43	6	11	233	–	–	–	698	12	–	13	–	3	–	–	–	79	33	–
Eastbrook,	2	45	57	20	45	132	–	–	–	420	158	–	30	9	21	110	154	–	190	617	–
Eden,	7	61	258	45	93	869	–	–	–	3093	328	–	39	23	65	126	240	29	531	259	–
Gouldsborough,	10	35	351	52	139	1113	–	–	–	4212	220	–	67	6	56	40	50	–	150	100	–
Hancock,	8	119	187	60	70	980	7	12	–	2940	339	–	102	21	54	301	337	2	1101	917	17
Mariaville,	3	70	123	36	96	307	–	–	–	966	116	–	20	9	44	169	272	119	65	1152	36
Mount Desert,	2	100	188	28	88	1194	–	–	–	4776	450	–	49	6	35	25	125	–	200	200	2
Orland,	3	200	290	133	139	852	–	–	–	3119	217	–	85	109	87	758	199	23	3280	2850	–
Otis,	6	36	46	15	11	152	–	–	–	430	50	–	23	6	25	115	120	30	90	1021	20
Penobscot,	27	190	372	135	120	1465	–	–	–	4395	632	–	113	40	70	396	215	–	2885	3046	70
Surry,	7	166	230	44	100	1036	–	12	17	3322	436	4	66	18	56	340	236	72	1670	1866	40
Tremont,	10	92	279	100	112	985	–	–	–	2500	184	–	34	10	49	41	237	–	359	–	–
Verona,	6	47	63	30	20	173	–	–	–	559	32	–	44	7	9	19	21	20	222	352	5
No. 33, Middle Division,	1	18	20	12	16	–	–	30	6	129	10	–	21	2	8	–	69	–	218	280	–
	108	1284	2612	854	1180	10941	307	54	23	35694	4084	4	769	492	638	2640	2475	295	14950	13193	390

HANCOCK COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Brooksville,	9800	1500	600	300	500	750	240	40	3600	500	400	–	–	1000	250	300	–	–	–	–
Cranberry Isles,	1767	100	–	–	–	76	–	–	3075	–	–	–	–	402	–	30	–	–	–	–
Eastbrook,	2000	150	75	60	150	78	20	–	3600	500	150	200	50	75	–	–	–	–	–	–
Eden,	6823	845	399	157	280	414	240	5	18058	–	–	–	–	1265	187	121	52	2	–	–
Gouldsborough,	2500	700	100	90	40	400	200	25	600	–	–	–	–	100	80	100	50	20	–	75
Hancock,	8656	1480	222	96	1136	615	92	9	23210	50	250	20	–	2176	157	231	19	17	–	–
Mariaville,	4844	250	60	78	1419	438	21	–	8091	266	369	–	–	481	155	124	18	8	4	11
Mount Desert,	2500	600	150	75	50	650	–	–	1880	–	–	–	–	500	50	100	–	1	–	–
Orland,	13562	1895	1290	265	1310	1466	53	–	27600	700	974	–	–	1876	384	362	–	–	–	100
Otis,	2810	228	103	40	150	219	11	–	6635	–	450	84	–	392	63	96	2	3	–	–
Penobscot,	10995	678	100	450	2068	981	100	15	19472	1650	–	–	–	877	698	491	108	–	–	234
Surry,	12756	3868	568	276	504	834	–	2	4624	194	150	14	–	1870	336	376	–	106	20	324
Tremont,	4744	2254	1050	153	–	285	23	–	7963	–	–	–	–	3285	73	74	–	48	–	200
Verona,	2742	191	52	78	21	266	–	–	4414	–	8	–	–	394	38	63	–	6	30	18
No. 33, Middle Division,	1345	28	27	16	286	116	50	–	2150	–	–	–	–	117	39	33	–	–	–	–
	87854	14767	4796	1737	7914	7538	950	96	134970	3854	2751	318	50	13810	2510	2201	249	211	54	962

KENNEBEC COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buckwheat.
Albion,	12	233	462	306	246	3256	–	–	–	9768	150	–	206	63	222	5997	2934	478	5418	7201	227
Augusta,	31	369	951	161	258	1791	255	69	101	5782	2560	5	623	151	583	5927	524	440	9620	14570	405
Belgrade,	6	175	483	210	252	3732	–	–	–	13058	–	–	219	63	208	6833	2104	247	5178	7526	74
Benton,	8	200	201	194	122	1944	–	–	–	5056	62	–	133	52	140	3950	670	490	4856	15845	129
Chelsea,	5	50	267	200	120	168	–	–	–	572	–	–	200	25	150	1200	25	150	3000	2300	50
China,	10	380	755	520	303	2260	304	520	1480	10200	250	–	309	93	349	7850	1818	218	10408	5556	275
Fayette,	12	205	318	221	210	1104	235	62	96	4011	102	–	122	42	138	4024	1471	61	2360	2907	32
Hallowell,	6	46	198	40	74	288	–	–	130	1772	50	–	220	18	160	1170	176	90	2752	795	–
Litchfield,	15	90	661	120	224	800	300	–	–	4000	100	100	300	45	300	2700	450	225	937	3437	25
Manchester,	7	116	277	118	146	1550	–	–	54	3638	86	20	125	50	150	3046	153	157	3725	3753	35
Monmouth,	13	277	602	243	283	1164	75	200	75	4510	248	50	271	40	230	7000	1600	325	5000	3651	143
Pittston,	13	227	564	194	206	607	102	196	144	3046	32	–	163	75	495	4024	330	281	4545	3918	21
Sidney,	16	204	573	271	238	4300	15	–	9	12773	216	–	298	69	288	8731	820	156	9271	12573	162
Vassalborough,	20	306	807	300	281	2855	160	254	112	7728	278	–	310	104	287	10059	910	313	13141	7108	46
Vienna,	6	155	280	308	170	1306	225	110	250	5621	151	21	128	31	119	3085	1884	133	1649	2653	71
Wayne,	8	121	374	251	126	100	200	181	400	3111	500	8	117	35	138	4584	1153	116	1759	2892	–
West Gardiner,	16	126	444	137	144	1088	–	–	–	3422	29	–	210	28	193	3487	134	109	3415	7244	65
Windsor,	12	160	540	420	242	1836	–	–	–	6426	1000	–	232	76	153	3863	602	150	4541	6807	52
Winthrop,	20	500	603	445	450	2531	140	71	190	6915	409	103	314	78	307	4101	1870	562	6117	7470	43
Unity plantation,	1	13	17	18	16	80	–	–	–	197	2	20	12	4	8	300	68	–	146	410	–
	243	4043	9557	4740	4125	32949	2011	1663	2941	111706	6225	327	4602	1151	4627	91931	19696	4701	97838	118617	1855

KENNEBEC COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Albion, ...	26320	2066	704	754	17403	2842	250	61	26932	3345	916	281	129	2944	987	244	–	8	–	40
Augusta, ...	61891	4321	613	1904	11033	5366	577	17	50552	4093	2172	12	7	4063	979	314	–	8	7	28
Belgrade, ...	40412	951	255	155	20604	2975	318	–	32178	7955	947	295	20	2767	1450	204	–	–	–	10
Benton, ...	20490	477	205	119	3286	2282	–	120	30150	4505	1070	65	–	2041	–	–	–	–	–	–
Chelsea, ...	11000	200	75	75	1000	1500	400	–	12000	–	500	–	–	500	200	100	–	10	–	40
China, ...	31798	1505	540	650	18231	3880	332	–	44838	9060	767	76	61	5342	1333	411	2	20	19	70
Fayette, ...	13932	709	707	173	12228	2001	–	246	18571	10614	275	184	201	2164	450	135	–	5	–	20
Hallowell, ...	5410	400	200	400	6500	1120	–	–	21275	275	250	–	–	850	190	80	–	–	–	–
Litchfield, ...	16000	750	475	450	24000	630	300	50	18435	3241	100	200	50	2339	400	150	–	–	–	–
Manchester, . . .	13305	923	288	115	12890	1885	–	–	21145	3750	500	36	95	1325	460	99	–	12	–	60
Monmouth, . . .	30000	1119	300	345	17795	2564	473	225	42000	18066	475	455	200	2811	1300	300	–	4	24	25
Pittston, ...	24144	1165	538	361	7444	3250	479	–	38835	1425	1620	384	–	2409	505	407	–	14	–	72
Sidney, ...	33011	2558	759	626	23812	4502	519	–	43143	18077	1253	39	80	4156	1397	327	–	3	6	21
Vassalborough, . . .	36394	1682	466	628	23153	5120	–	–	6225	9659	940	–	–	4690	1113	222	–	11	–	38
Vienna, ...	12545	1425	352	69	10864	1582	470	–	17889	2850	165	60	644	2183	561	139	–	2	2	12
Wayne, ...	10635	616	63	172	10363	1198	410	–	22625	10523	346	60	232	1933	326	52	–	17	4	84
West Gardiner, . . .	24866	1348	690	287	13720	2288	371	–	39269	7020	1427	–	–	3252	700	384	–	1	–	3
Windsor, ...	103673	1112	308	324	10689	2936	275	–	37331	4220	455	–	–	3948	896	450	–	–	–	–
Winthrop, ...	36120	3009	1581	516	5013	4110	219	–	51187	13818	694	911	105	3582	480	340	–	27	–	65
Unity plantation, . .	1344	12	5	–	412	88	–	22	933	100	–	–	–	124	74	28	–	–	–	–
	553290	26348	9098	8123	249440	52119	5343	741	575513	133186	14872	3058	1824	53423	13801	4387	2	142	62	588

KNOX COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Appleton, . . .	14	348	454	206	234	1628	–	–	–	5205	196	–	208	44	157	3498	409	747	2850	4484	29
Camden, . . .	34	344	730	121	267	1278	–	–	–	4977	423	–	502	40	333	1306	488	535	3715	2426	–
Cushing, . . .	7	87	172	52	67	537	–	–	–	1698	175	–	69	10	36	321	71	128	1000	208	–
Friendship, . .	3	68	150	36	52	369	–	–	–	861	127	–	28	8	41	169	23	89	699	151	–
Hope, . . .	6	156	335	82	136	851	–	–	–	2290	91	–	150	20	115	1882	454	317	2800	749	40
Rockland, . .	3	80	381	24	76	108	–	–	–	–	–	–	157	14	393	396	196	2	1316	286	–
South Thomaston, .	10	130	256	36	46	407	–	–	–	1793	35	–	236	15	81	235	653	188	1387	616	–
St. George, . .	13	172	311	28	100	808	–	–	–	2474	320	–	47	6	99	113	62	6	534	211	–
Thomaston, . .	2	100	280	30	35	120	–	–	–	300	–	–	117	15	160	277	37	26	796	53	–
Vinalhaven, . .	6	25	175	10	78	2000	–	–	–	7050	350	–	100	15	12	62	120	–	475	68	–
Warren, ...	28	434	489	231	206	1277	40	2	31	4072	309	–	257	52	219	3363	404	784	3864	3067	83
Washington, . .	11	240	377	243	242	1009	–	14	–	2651	92	–	153	43	158	2514	611	606	1890	6761	36
	137	2184	4110	1099	1539	10392	40	16	31	33521	2118	–	2024	282	1805	14136	3528	3428	21326	18880	188

KNOX COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Appleton,	28593	1347	243	548	9116	2498	-	499	53265	3149	487	192	2	2707	810	318	1	2	2	4
Camden,	18836	3589	1410	1321	7929	3315	356	54	73000	-	-	-	-	6957	-	-	-	-	-	-
Cushing,	6283	1177	134	130	155	610	-	145	17475	-	-	-	-	1698	99	102	-	-	-	-
Friendship,	6349	940	69	114	114	357	154	15	9873	60	25	-	-	800	19	61	2	-	-	-
Hope,	16745	974	239	273	6716	2048	285	-	33393	4695	561	48	16	1794	499	260	-	-	-	-
Rockland,	9803	1725	531	1582	1067	897	-	-	22560	400	90	-	-	1052	294	108	-	2	-	6
South Thomaston,	9581	2761	88	780	209	915	105	54	27130	1820	-	-	-	1665	195	176	11	3	-	32
St. George,	9902	3124	154	178	-	857	131	7	27648	-	-	-	-	1570	13	21	-	9	1	28
Thomaston,	3571	1298	35	240	190	710	-	30	-	-	-	200	-	-	25	-	-	-	-	-
Vinalhaven,	2000	932	45	50	-	250	50	-	2000	600	-	-	-	1475	-	-	-	-	-	-
Warren,	23074	2458	425	730	6700	2516	227	723	50294	6010	68	-	-	3545	627	382	-	17	18	83
Washington,	20121	1203	198	71	6110	832	274	-	17637	1443	350	84	11	997	478	193	-	-	-	-
	154858	21528	3571	5317	38306	15805	1582	1527	332275	18177	1581	524	29	24050	3059	1621	14	33	21	153

LINCOLN COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Alna, . . .	3	172	281	210	155	622	–	–	–	1201	89	–	87	40	121	1317	54	213	2657	879	–
Bremen, . . .	2	102	183	56	114	581	–	–	–	1549	128	–	57	9	44	682	31	35	1259	749	–
Dresden, . . .	13	209	418	151	230	700	–	–	–	2285	132	–	173	35	110	2803	132	243	3497	2053	95
Edgecomb, . . .	6	120	286	99	176	626	–	16	–	2481	242	6	113	17	74	1473	8	166	2713	610	–
Jefferson, . . .	23	450	500	401	375	1500	100	300	25	4992	343	8	200	50	200	4402	543	363	3948	5100	4
Newcastle, . . .	14	218	386	236	142	900	25	–	–	3600	522	–	200	65	161	2106	120	300	5000	500	20
Nobleborough, . .	12	183	321	271	160	531	–	–	40	1900	251	30	162	15	125	5000	160	325	4121	1030	–
Waldoborough, . .	19	545	800	310	473	1472	18	16	–	4726	444	88	334	32	283	2171	272	809	6321	2157	49
Whitefield, . .	8	403	645	310	324	1627	37	20	–	4742	149	–	265	59	257	4116	407	261	5544	7438	46
Wiscasset, . . .	10	150	300	129	188	623	4	–	15	1922	230	125	174	20	100	1700	118	56	2500	296	–
	110	2552	4120	2173	2337	9182	184	352	80	29398	2630	257	1765	342	1475	25771	1845	2771	37060	20912	214

LINCOLN COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Alna, . . .	9185	690	116	156	2390	1420	256	–	14371	200	100	75	–	364	260	167	–	4	–	16
Bremen, . . .	6533	547	221	370	787	804	136	48	14958	175	–	–	–	1467	93	58	–	–	–	–
Dresden, . . .	18848	1318	166	285	5929	2522	705	–	36140	–	206	–	–	2277	295	235	–	5	10	25
Edgecomb, . .	8367	735	216	314	8753	1311	962	52	20680	110	90	–	–	1660	251	95	–	2	–	9
Jefferson, . . .	22290	156	141	8565	1956	494	805	805	27572	1021	290	4	5	3021	664	199	2	6	9	14
Newcastle, . . .	11520	1065	200	800	4000	3000	100	500	38600	4000	500	–	–	4000	400	120	–	40	–	80
Nobleborough, . .	11782	1600	600	785	9121	2431	507	100	3000	450	250	355	60	45	760	310	–	6	3	20
Waldoborough, . .	27859	3716	218	1027	5624	3516	162	504	68108	1300	310	278	14	4763	466	463	–	62	65	316
Whitefield, . .	33554	1447	193	241	8530	2841	200	601	41532	610	302	364	87	3111	760	387	–	33	12	120
Wiscasset, . . .	9014	621	381	487	2500	2058	99	181	30633	–	333	–	–	4200	275	365	–	–	–	–
	158952	11900	2452	13030	49590	20397	3932	2794	295594	7866	2381	1076	166	24908	4224	2399	2	158	89	610

OXFORD COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Albany,	22	236	219	222	150	1914	–	–	–	5571	103	5	104	25	88	3173	1172	422	8	4484	82
Andover,	12	230	272	203	197	1878	108	–	2	4756	144	–	159	67	193	1702	1392	3559	1259	6784	2781
Bethel,	32	648	610	620	347	3888	–	–	–	11037	66	–	265	722	264	8012	2333	1101	1069	10646	717
Byron,	4	90	94	110	64	504	40	100	–	1601	21	–	41	13	41	366	588	80	173	1026	800
Canton,	21	316	341	348	129	770	60	984	12	5647	600	89	150	80	136	6055	1213	544	1015	7593	111
Dixfield,	22	222	301	301	221	1822	34	–	–	5314	32	29	138	53	102	3545	1342	409	706	5980	171
Fryeburg,	27	493	514	552	398	1499	19	–	–	3038	11	50	251	70	265	8991	384	504	115	10605	511
Gilead,	9	131	143	118	78	706	–	–	–	1802	51	–	77	17	63	2047	356	237	228	2753	263
Grafton,	4	35	33	14	28	163	–	–	–	320	–	–	27	4	20	–	110	180	–	500	–
Greenwood,	18	200	253	196	207	1585	–	–	–	4755	50	53	129	46	104	3019	1230	370	682	3893	103
Hanover,	4	57	79	50	56	900	–	–	–	1996	28	64	58	23	35	1034	125	255	453	927	430
Hartford,	21	351	441	402	299	2408	145	8	94	9256	140	25	239	65	180	7602	2892	295	1479	4606	72
Hebron,	9	192	280	137	212	1180	–	–	–	3344	67	–	103	30	89	3021	373	158	1692	2696	50
Hiram,	16	306	391	252	270	794	–	192	–	3044	18	100	220	40	148	9828	2227	483	122	3793	34
Lovell,	16	192	331	249	212	959	–	–	–	2306	13	151	168	46	127	1542	1411	753	176	2944	129
Mason,	4	48	45	69	26	243	–	18	–	646	14	33	33	8	17	611	227	168	6	577	142
Mexico,	15	189	194	219	117	1178	32	32	10	3116	39	102	94	20	44	2520	778	491	371	2885	450
Newry,	8	192	149	155	90	839	–	–	–	2517	30	28	82	24	86	820	508	490	130	1405	110
Norway,	33	456	546	372	294	1612	6	79	2	5312	108	71	329	55	195	8857	2112	250	1813	10572	39
Paris,	41	517	670	580	413	2644	56	–	–	9254	327	–	300	75	293	14000	2317	413	3780	8896	59
Peru,	17	357	376	500	248	2016	100	203	175	5868	110	–	176	66	133	6768	1963	775	394	4555	225
Porter,	5	291	369	280	260	671	–	–	–	1363	–	–	223	45	140	10207	1712	396	6	2372	15
Roxbury,	1	63	70	45	54	401	–	–	–	1126	13	32	40	11	39	405	268	169	551	1468	191
Sumner,	13	439	536	548	340	2708	240	–	–	8443	300	–	183	58	215	7422	2315	606	1014	7016	47
Sweden,	12	162	262	158	116	–	–	–	640	1841	20	–	132	32	108	4809	1223	484	28	2812	23
Upton,	7	42	58	56	61	358	–	–	–	·1032	–	–	53	8	23	5	449	112	354	1090	1018
Woodstock,	15	200	315	250	246	3746	–	–	–	9400	450	–	130	74	93	2611	2550	426	350	3980	100

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Franklin plantation, .	5	60	74	83	54	300	50	75	124	1850	25	50	38	15	31	1689	815	115	94	351	10
.	413	6625	7503	7089	5487	37692	890	1691	1059	115555	2780	973	3912	1792	3272	120659	34385	14245	18071	117209	8283

OXFORD COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Albany, . . .	15580	947	561	43	3165	1100	125	400	17155	4456	250	150	14	756	150	125	25	5	–	20
Andover, . . .	20915	1836	316	131	3007	1477	502	–	14978	3092	155	235	73	948	204	128	4	–	–	–
Bethel, . . .	46505	749	564	50	8439	2910	1237	–	32425	4430	1120	6360	162	1762	196	184	–	–	–	–
Byron, . . .	5326	200	140	60	1240	360	378	–	3940	1585	–	–	–	149	95	35	–	–	–	–
Canton, . . .	20691	1802	240	156	11143	1331	583	334	25026	20549	700	50	156	1962	491	171	5	12	1	24
Dixfield, . . .	10544	463	–	81	10041	1838	324	–	11490	16980	60	557	148	374	466	140	33	–	–	–
Fryeburg, . . .	24860	737	737	147	3487	486	1325	1690	32910	9617	–	15140	2550	1951	539	62	–	15	3	65
Gilead, . . .	8180	587	69	25	3805	148	670	272	8915	3265	30	1300	75	466	63	–	5	12	–	24
Grafton, . . .	2500	300	50	–	–	125	110	–	1500	–	–	–	–	–	–	–	7	–	–	–
Greenwood, . .	16875	543	152	90	5014	1293	122	–	16225	2365	585	862	6	2469	289	100	–	–	–	–
Hanover, . . .	5900	239	47	17	1880	169	185	155	3500	1840	70	1412	88	317	157	67	9	18	9	27
Hartford, . . .	23924	1668	479	228	21528	2260	541	–	29490	16217	358	264	285	2272	649	213	–	–	–	–
Hebron, . . .	15034	875	217	100	11113	775	985	–	15025	7070	58	1685	318	1254	209	50	–	–	–	–
Hiram, . . .	18148	371	119	55	9920	1846	164	94	30454	3415	–	–	64	1362	791	39	–	21	10	97
Lovell, . . .	13758	925	287	121	4586	1153	20	301	18040	2305	405	100	77	720	394	104	–	2	–	8
Mason, . . .	3012	469	59	28	158	322	28	–	3800	420	90	437	17	292	51	73	10	–	–	–
Mexico, . . .	7893	615	126	78	5980	1133	176	–	10220	5277	331	–	84	997	341	94	29	2	–	6
Newry, . . .	8912	90	20	7	306	508	217	189	4017	365	–	1427	25	150	50	20	56	4	7	40
Norway, . . .	32497	1212	1032	194	24175	2843	518	–	41710	11795	415	329	174	2591	710	298	–	24	–	75
Paris, . . .	28600	1300	700	150	23800	2978	500	–	38100	3746	510	270	300	2046	673	170	–	–	–	–
Peru, . . .	17568	1768	705	93	3318	1475	1000	98	25889	17371	598	501	235	1711	308	110	–	–	–	–
Porter, . . .	16285	920	120	41	13699	1246	394	–	13450	3900	–	1020	48	1609	759	50	–	–	–	–
Roxbury, . . .	3740	351	113	11	2200	227	339	13	3477	550	–	21	15	234	92	36	27	–	–	–
Sumner, . . .	22500	995	761	250	19900	2272	1289	–	27900	16900	900	775	125	850	573	158	–	–	–	–

OXFORD COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Sweden,	13310	438	170	53	3918	889	9	69	15965	3535	-	-	87	739	270	43	-	-	-	-
Upton,	3680	222	107	4	-	179	25	-	1985	1600	-	400	32	-	-	10	12	6	-	30
Woodstock,	21310	1000	1100	400	3900	1848	100	-	14885	4961	500	225	75	-	550	960	-	-	-	-
Franklin plantation,	4374	193	66	11	761	600	20	17	6715	1045	25	40	30	329	-	-	-	-	-	-
	432456	21815	8457	2624	200483	33794	11882	3632	479386	168661	7070	33560	5263	28710	9070	3440	222	121	30	416

PENOBSCOT COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Bangor,	16	315	756	56	96	483	19	48	1	691	4033	1	489	66	669	516	415	182	7852	4546	144
Bradford,	36	309	382	250	154	1780	–	–	–	5139	197	–	206	53	249	2456	1011	167	2961	6705	1100
Bradley,	2	67	111	40	53	192	–	–	–	449	16	–	56	13	57	226	167	9	570	586	32
Brewer,	2	114	280	73	26	254	–	–	–	830	11	–	120	26	190	213	40	83	2177	3939	84
Carroll,	8	128	173	93	88	646	–	150	–	2126	91	130	93	28	86	825	1708	98	1896	8006	501
Charleston,	8	277	440	–	166	2280	140	–	–	9680	200	1	218	43	252	4500	1600	50	5514	7001	375
Chester,	7	103	88	70	52	390	–	–	–	1101	35	–	54	13	30	498	1650	20	292	3001	549
Corinna,	9	297	485	270	222	3339	–	–	–	9295	214	95	237	59	249	4225	3080	170	2736	10161	124
Corinth,	27	399	524	247	230	3085	73	–	–	9619	711	–	301	83	296	4170	865	238	8042	12489	445
Dixmont,	33	332	419	285	199	3845	–	–	–	11024	187	–	222	73	201	2826	2015	169	5277	14083	41
Edinburg,	1	5	18	10	10	56	–	–	–	198	10	–	8	1	2	20	93	–	16	157	35
Enfield,	8	108	173	66	52	329	–	125	–	1358	82	–	58	19	67	352	564	36	387	4474	587
Exeter,	6	126	–	66	255	3557	9	–	74	11083	1801	–	268	75	306	4848	2063	63	5087	17112	94
Garland,	19	374	469	266	238	2340	–	–	46	6333	102	8	202	71	211	2943	2935	139	4004	8562	232
Glenburn,	14	247	287	108	94	672	111	142	10	2249	79	–	94	55	134	433	303	127	2971	3924	255
Hermon,	21	321	461	171	59	1350	12	–	35	3565	146	–	174	60	232	937	457	159	4332	7685	260
Holden,	4	135	227	154	127	1024	8	11	–	3810	191	–	86	37	109	935	521	104	2160	2881	35
Hudson,	6	107	128	82	77	868	29	–	–	1648	56	–	102	19	82	642	185	75	613	2116	144
Mattawamkeag,	4	47	55	12	29	153	–	–	–	341	42	–	34	5	25	101	230	27	420	1306	220
Maxfield,	2	43	66	29	20	243	–	–	–	450	5	–	17	9	25	150	355	–	45	968	450
Newburg,	5	398	440	286	134	2865	–	–	–	7763	421	–	178	53	249	1662	851	320	4879	13092	49
Newport,	10	152	410	270	180	2000	100	600	400	12400	560	–	259	56	210	3950	2560	175	3150	7200	–
Oldtown,	10	129	317	25	40	350	42	43	3	1047	591	–	251	34	232	554	30	151	2251	4349	108
Orrington,	14	263	431	55	74	793	38	30	–	2551	325	–	149	–	170	309	305	166	5473	4003	88
Patten,	8	148	167	180	68	922	–	–	–	2291	46	30	123	37	102	212	1972	196	2251	9370	1686
Stetson,	–	–	357	447	168	2074	–	–	–	4109	151	–	144	26	158	2232	1178	233	2002	10041	164
Veazie,	2	31	85	20	12	4	6	–	–	35	–	–	63	8	55	75	–	55	1062	1907	–

PENOBSCOT COUNTY, (Continued.)

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Webster, ...	–	11	13	13	12	24	–	–	–	179	12	–	4	4	5	106	238	–	179	1104	75
No. 2, Grand Falls, .	1	7	17	6	16	–	–	–	24	75	–	–	2	1	4	77	172	26	20	543	–
	294	5290	8164	3660	2951	35218	579	1047	573	113539	10295	264	4203	1027	4657	41003	26563	3238	78619	171061	7477

PENOBSCOT COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Bangor, ...	32125	5327	1936	793	1079	2908	216	300	28705	905	1213	–	–	3031	420	417	–	9	18	81
Bradford, ...	39600	1516	666	175	2620	2177	–	–	32987	978	2903	293	45	2832	716	770	–	–	–	–
Bradley, ...	6077	340	161	277	276	353	–	198	7710	425	13	–	–	806	89	107	3	5	–	16
Brewer, ...	9991	692	1184	173	175	1207	64	–	10145	667	827	–	–	860	135	127	–	5	–	30
Carroll, ...	12286	1248	551	35	473	710	20	–	14000	6631	81	179	146	406	217	149	5	1	1	4
Charleston, . . .	55129	1147	505	200	2804	2501	125	–	40100	3050	1500	1000	–	2500	–	–	–	–	–	–
Chester, ...	5315	207	107	38	734	426	136	–	5925	965	690	–	15	280	98	406	2	1	–	10
Corinna, ...	46657	934	483	324	9419	2432	77	–	31808	12557	3194	567	102	2156	1109	1452	9	2	4	700
Corinth, ...	85907	1475	386	282	10790	3547	278	21	54289	13035	5034	85	114	2188	1154	1875	–	12	4	75
Dixmont, ...	46570	754	298	405	14405	2511	423	14	40960	6234	2348	130	50	2927	814	231	–	4	2	20
Edinburg, ...	830	35	32	12	60	125	50	–	925	–	–	–	–	40	13	16	7	–	–	–

Enfield,	7361	297	'233	85	1709	397	65	–	12450	–	405	165	20	655	163	621	–	–	–	–
Exeter,	66203	1045	514	294	3827	3258	75	–	45539	6319	3042	521	163	2854	1403	1455	–	–	–	–
Garland,	47800	1371	507	229	8171	2888	53	–	40709	6296	2293	309	228	1943	1049	271	1	4	1	12
Glenburn,	20945	2094	333	105	1247	1107	211	180	20786	865	1226	–	–	916	209	399	4	7	–	33
Hermon,	33313	1152	410	209	2130	2019	383	–	40656	1700	1907	28	–	1422	449	513	–	7	–	45
Holden,	19696	276	246	135	3796	1356	167	–	24818	3365	905	–	11	693	263	182	–	–	–	–
Hudson,	14303	1097	310	60	1489	680	281	–	11210	573	2105	–	16	1110	256	161	1	–	–	3
Mattawamkeag,	3277	267	180	35	34	273	42	–	5600	–	125	–	–	200	83	42	8	–	–	–
Maxfield,	3525	85	5	28	1364	262	10	–	3210	317	215	145	4	108	50	8	3	–	–	–
Newburg,	53615	1089	261	321	12551	2583	489	93	32225	2010	1495	1629	137	3423	713	263	3	30	7	140
Newport,	30460	550	710	–	4570	2140	160	–	30185	9210	1865	–	–	1760	455	200	–	10	50	100
Oldtown,	23769	3079	1436	1552	1000	1185	–	237	24718	–	216	200	–	1864	–	–	–	–	–	–
Orrington,	27839	940	630	256	4248	2051	75	–	29478	803	587	–	–	1533	468	303	–	2	1	–
Patten,	10172	1397	55	44	364	932	–	–	10215	1905	75	30	10	492	112	535	31	2	–	10
Stetson,	27650	440	196	–	2337	1614	75	–	35890	4675	1734	500	50	350	608	100	–	3	1	15
Veazie,	8791	185	215	54	60	392	–	–	8500	225	150	450	–	297	79	173	–	–	–	–
Webster,	1156	357	20	20	27	61	40	–	900	–	–	110	4	67	35	7	–	–	–	–
No. 2, Grand Falls,	471	–	–	–	30	60	2	–	400	–	–	–	–	200	–	–	–	–	–	–
	929499	29396	12125	5041	91789	41848	3517	1043	652043	84040	36328	5431	1015	34816	10090	10808	77	107	87	601

PISCATAQUIS COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Barnard, . . .	6	28	38	16	29	127	–	–	–	310	13	–	22	8	12	166	250	3	112	500	40
Bowerbank, . .	1	20	33	36	20	170	–	–	–	528	20	–	15	5	9	390	235	62	125	770	–
Blanchard, . .	7	50	64	42	18	442	–	–	–	988	34	25	26	10	29	188	157	35	1106	1312	179
Brownville, . .	10	122	207	74	74	858	–	12	1	2293	134	–	124	51	110	1013	1161	–	1987	8254	978
Guilford, . . .	21	146	243	104	120	1320	–	–	7	4800	70	12	177	52	133	1267	1492	24	2288	6039	9
Greenville, . .	8	70	88	39	50	325	–	–	–	882	21	–	42	10	59	–	383	25	727	2969	69
Medford, . . .	14	65	87	62	44	280	–	17	–	975	16	–	53	9	42	237	589	30	257	2582	287
Milo, . . .	15	210	300	175	132	1425	–	–	–	3758	108	51	206	62	140	1676	1798	45	1800	6787	890
Sangerville, . .	15	197	290	242	161	3514	–	–	–	13126	97	1	184	56	171	1790	2564	74	5365	11147	60
Sebec, . . .	6	240	304	208	162	1665	–	–	140	2823	16	–	151	42	157	1761	5701	42	2642	11183	119
Shirley, . . .	1	45	72	5	53	586	–	–	1	1822	37	–	27	16	33	6	485	13	1022	3328	201
Williamsburg, . .	3	30	42	19	180	138	–	–	–	423	12	–	14	6	24	181	388	–	251	810	421
	107	1232	1768	1022	1044	10892	–	29	149	32728	481	89	941	327	919	9175	15206	353	17682	55681	3333

PISCATAQUIS COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Barnard,	3700	93	83	8	600	182	7	–	2275	100	500	–	3	65	52	47	2	1	–	–
Bowerbank,	1585	215	30	30	390	260	–	–	3300	825	300	350	30	152	30	60	–	–	–	–
Blanchard,	3240	616	45	26	582	333	65	–	6320	2120	70	100	10	219	55	43	8	–	–	–
Brownville,	14891	2034	257	103	2237	851	7	14	18490	3025	630	253	36	782	250	294	6	2	–	6
Guilford,	17273	616	137	62	5011	1368	27	–	16063	5520	265	181	81	591	266	81	–	–	–	–
Greenville,	4833	60	–	16	28	399	20	–	5118	615	–	–	–	116	10	5	–	–	–	–
Medford,	6445	102	48	6	346	431	48	51	5755	340	268	12	–	248	93	150	26	–	1	–
Milo,	20550	890	157	53	1530	1496	–	–	18662	2985	1430	–	–	1681	449	711	24	1	1	3
Sangerville,	39165	219	193	38	7810	2119	–	–	19598	6035	2050	–	–	1256	465	1056	–	–	–	–
Sebec,	24530	492	58	–	6675	1676	8	–	23165	3550	780	225	93	1804	557	322	–	–	–	–
Shirley,	5120	305	4	5	62	327	–	–	4400	520	–	305	30	200	1	21	1	3	6	18
Williamsburg,	2832	127	35	38	624	381	2	–	3560	575	290	–	12	210	74	51	–	–	–	–
	144164	5769	1047	385	25895	9823	184	65	106706	26220	6584	1426	295	7324	2299	2841	67	7	8	27

SAGADAHOC COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Arrowsic, . . .	4	40	80	50	60	300	–	–	–	900	20	–	60	8	20	240	–	–	400	50	–
Bowdoinham, . .	8	209	286	159	120	1205	–	3	2	4142	500	45	225	29	173	3265	518	205	6202	3432	6
Georgetown, . .	10	34	175	36	82	320	–	–	–	960	75	–	–	3	24	120	50	10	150	60	–
Perkins, . . .	3	19	35	6	22	115	–	–	–	343	13	–	14	4	8	389	60	34	236	516	–
Richmond, . . .	5	218	426	244	134	796	–	198	–	2262	212	20	114	25	146	1788	300	138	2888	3464	–
Topsham, . . .	19	132	305	150	224	1087	61	214	–	3939	380	57	178	25	120	3125	365	242	3113	2515	113
West Bath, . . .	3	73	131	30	30	146	–	–	–	474	86	–	67	6	58	392	42	–	1338	32	17
Woolwich, . . .	10	334	496	290	252	1296	–	–	–	5184	50	–	164	33	120	2558	68	159	4576	397	–
	62	1059	1934	965	924	5265	61	415	2	18204	1336	112	822	133	669	11875	1403	788	18903	10466	136

SAGADAHOC COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Arrowsic,	1000	100	–	50	500	240	50	150	2500	–	–	–	–	200	50	20	–	–	–	–
Bowdoinham,	10264	7264	1117	684	9224	2854	475	–	21375	990	1025	–	–	50	651	312	–	16	42	71
Georgetown,	1000	40	–	–	100	500	–	–	8750	–	–	–	–	200	20	10	–	–	–	–
Perkins,	1202	27	19	141	142	293	12	17	2300	–	–	–	–	168	57	–	–	–	–	–
Richmond,	16761	432	117	130	2223	2852	236	–	28969	645	395	–	–	1162	393	239	–	3	–	9
Topsham,	18220	1396	265	1028	9122	1852	216	716	30061	561	295	21	26	527	570	235	–	6	7	23
West Bath,	5130	674	66	577	682	625	15	15	11102	232	–	–	–	1106	118	86	–	–	–	–
Woolwich,	21000	528	210	357	3450	3166	675	100	32160	–	–	–	–	1250	375	150	–	–	–	–
	73577	10561	1794	2967	25443	12382	1679	998	137217	2428	1715	21	26	4673	2234	1052	–	25	49	103

SOMERSET COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Anson,	15	392	467	478	264	–	–	–	11944	38705	82	48	250	100	252	5228	2996	202	4791	15273	256
Athens,	5	–	489	839	308	4261	–	–	–	4000	100	150	236	82	207	2500	1000	50	6000	9000	275
Bingham,	16	163	244	155	141	1350	–	–	702	5652	60	104	143	34	136	1715	1218	197	3814	8600	212
Brighton,	7	143	183	203	138	1515	–	–	–	3732	57	110	113	30	76	875	1270	111	1113	2550	259
Cambridge,	4	153	158	120	90	1962	–	–	–	4720	61	–	108	22	67	1373	1972	16	989	5205	18
Concord,	4	26	143	46	88	811	–	–	1520	5609	46	–	115	29	61	469	883	709	842	669	255
Cornville,	10	362	356	460	218	5662	–	–	200	11389	148	75	170	93	203	3063	1101	67	1660	9469	60
Detroit,	7	106	157	81	60	820	4	12	11	2242	55	–	61	26	79	1352	491	72	1357	1921	15
Embden,	10	250	320	339	142	3202	–	–	–	10586	88	157	1193	44	129	3243	2502	399	3528	8003	662
Fairfield,	10	270	603	182	312	6595	–	–	–	16061	98	30	304	87	363	4783	922	182	9447	9498	82
Harmony,	17	247	324	264	212	3241	–	–	–	8392	132	14	159	48	145	3488	2126	52	3145	7009	147
Hartland,	5	147	214	188	138	1574	10	12	110	4031	75	10	142	36	24	2997	1149	218	2780	3352	77
Madison,	14	278	453	364	287	1823	–	–	5271	23250	142	102	302	84	229	4811	2104	501	10107	15130	395
Mercer,	10	164	316	236	188	2984	15	–	330	11251	82	50	146	25	158	4020	820	85	3600	6782	24
Moscow,	5	182	213	173	123	2636	–	–	850	6533	132	62	137	33	88	997	2052	557	3207	6449	2391
New Portland,	18	326	348	172	291	–	–	–	9830	30216	123	153	164	65	174	4788	2783	159	3287	9309	77
Norridgewock,	9	225	470	284	222	756	95	–	6974	23063	123	42	239	101	287	4290	1336	437	6885	12103	171
Palmyra,	15	378	503	310	262	1951	342	298	1277	10223	237	147	328	112	220	5185	2406	263	6033	7990	375
Pittsfield,	8	223	305	177	177	3196	–	–	–	5320	27	–	136	42	127	3763	1049	289	4021	6072	25
St. Albans,	14	345	414	356	210	3396	–	–	–	10022	136	148	268	73	212	5603	3646	659	3931	6739	250
Skowhegan,	13	430	698	378	302	775	370	1296	3750	18347	528	–	386	112	452	4926	1291	555	9583	8082	–
Smithfield,	8	109	223	220	184	1503	–	–	143	4563	229	–	188	23	69	3397	874	149	3312	3779	29
Moose River plantation,	3	31	29	13	14	161	–	–	–	445	14	–	22	4	12	–	223	–	331	2858	30
No. 2, R. 2,	2	30	42	30	30	572	8	–	–	1896	19	–	12	11	18	300	295	29	150	500	43
	229	4980	7792	6178	4301	47745	844	1618	42912	261268	3064	1402	8132	1196	3788	73227	36519	5838	106903	167542	6128

SOMERSET COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Anson, ...	39339	837	62	100	13812	4070	183	70	30323	7660	1666	–	355	2564	962	412	30	37	–	130
Athens, ...	22550	500	300	–	–	3000	50	–	–	–	–	–	–	–	1000	2500	–	–	–	–
Bingham, ...	13140	1550	25	60	6100	1419	325	92	12640	2150	855	2525	75	1458	440	510	16	4	–	75
Brighton, ...	10352	784	112	54	4777	1263	15	–	13755	1400	150	150	26	1079	263	160	3	–	–	–
Cambridge, ...	11430	96	48	15	2231	876	8	–	12195	2863	150	38	22	558	295	–	–	–	–	–
Concord, ...	8816	556	109	28	1299	1297	181	–	7405	1900	346	430	211	439	240	177	17	29	–	88
Cornville, ...	27661	818	168	78	10181	3360	100	19	26707	10196	2660	440	249	2456	716	465	–	–	–	–
Detroit, ...	12944	412	220	270	611	873	179	104	15106	2305	1436	–	4	848	350	365	1	5	–	20
Embden, ...	22051	1276	212	123	14786	2017	174	275	19232	4171	630	398	474	1950	650	505	–	–	–	–
Fairfield, ...	46225	1711	–	230	16246	3956	–	–	42530	31660	1255	500	407	2905	796	198	–	18	–	45
Harmony, ...	21942	995	174	91	12090	2203	–	–	20395	3082	1459	254	218	1163	733	532	5	4	–	24
Hartland, ...	19312	1028	153	220	6054	1760	100	–	30053	3951	1700	238	44	1919	533	257	10	3	–	–
Madison, ...	57360	1349	236	89	7954	9567	1574	73	33895	8710	1950	–	189	3489	1194	341	–	1	–	–
Mercer, ...	32872	501	48	100	10610	2234	101	256	22630	4750	720	24	222	1578	736	200	–	2	2	7
Moscow, ...	10997	2354	121	91	5282	1554	176	–	17400	3795	225	4336	137	2162	330	212	7	12	–	48
New Portland, . .	22832	1224	230	133	13599	3299	399	159	28185	5209	943	210	154	1915	776	304	16	20	–	47
Norridgewock, . .	47663	1309	264	278	12689	3332	–	372	23360	10175	1542	101	274	2012	912	427	–	–	–	–
Palmyra, ...	42084	890	635	304	7844	3111	289	–	35954	10837	3130	128	91	4066	1078	722	–	8	2	36
Pittsfield, ...	20585	786	449	309	2579	1853	134	–	12785	3340	2125	–	–	923	587	242	–	–	–	5
St. Albans, . . .	41035	787	349	139	9156	3100	70	–	35414	10180	991	84	156	2355	922	293	1	–	–	–
Skowhegan, . . .	48908	1416	792	170	29450	4325	–	–	29405	17545	712	–	648	2415	979	230	–	–	–	–
Smithfield, ...	19467	260	58	17	6192	1072	–	147	12460	3078	1305	–	33	454	652	575	4	41	41	169
Moose River plantation, .	2200	250	14	13	–	144	53	–	825	50	–	250	14	51	–	23	–	–	–	–
No. 2, R. 2, . .	1400	129	8	6	270	300	15	–	1950	340	–	100	–	150	75	69	16	20	11	60
	603165	21798	4777	2914	193812	59885	4026	1567	485604	149337	25950	9306	4021	38899	15169	9717	128	204	56	787

WALDO COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Belmont, . . .	3	92	195	164	54	640	–	–	–	1260	225	–	36	26	75	800	140	40	1500	1500	–
Frankfort, . . .	6	142	250	107	101	901	61	–	–	2333	139	–	83	33	127	377	341	73	2166	3581	25
Freedom, . . .	8	123	186	132	122	1277	–	–	240	3172	28	–	101	36	92	1199	1175	46	2286	2118	37
Islesborough, . .	8	262	200	70	74	711	33	–	19	2074	153	–	45	11	45	502	326	86	966	507	–
Knox, . . .	12	208	298	234	172	2498	–	5	30	6082	165	12	198	66	157	1988	1844	257	4168	4620	38
Lincolnville, . .	20	395	529	297	206	1962	–	–	–	5357	337	–	194	43	206	2281	959	103	3333	2718	–
Montville, . . .	7	434	532	400	256	3047	–	–	–	8479	329	–	210	43	235	3169	2215	286	6069	6422	–
Morrill, . . .	17	144	167	125	98	963	4	9	19	3103	232	19	127	25	104	1394	75	140	2240	2922	26
Northport, . . .	8	81	165	95	36	968	–	–	–	1875	273	–	72	20	86	576	231	21	994	1406	231
Palermo, . . .	7	233	278	164	168	1838	3	100	–	4658	96	–	198	48	150	3160	1292	103	2900	3414	72
Prospect, . . .	14	125	185	104	78	–	–	–	–	2274	167	–	124	22	58	610	66	–	1849	1700	49
Searsport, . . .	18	103	433	62	146	650	200	163	240	4064	1008	12	196	54	154	517	520	71	2312	3893	97
Swanville, . . .	11	190	283	139	102	960	–	–	–	3360	800	–	126	61	80	600	1000	–	2100	2500	–
Troy, . . .	24	270	369	284	197	3253	–	–	–	9570	116	–	185	38	188	3808	3043	380	3588	10792	22
Waldo, . . .	5	170	207	152	114	1097	–	52	–	2455	50	–	120	30	98	765	140	10	1808	3515	6
Winterport, . .	17	242	292	201	108	1525	200	800	–	8294	336	–	208	66	246	808	390	100	6922	12897	–
	185	2804	4469	2730	2012	21292	501	1029	548	69410	4554	43	2123	622	2901	22556	13757	1716	45101	64305	603

WALDO COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Belmont,	10000	200	150	200	1200	1000	400	–	19500	500	500	50	–	1200	100	100	–	50	50	150
Frankfort,	14933	675	288	269	3686	1469	38	3	16904	500	165	–	–	779	221	208	–	13	5	74
Freedom,	12415	513	174	62	4759	1092	109	4	4765	689	458	10	80	512	280	86	1	5	15	17
Islesborough,	7479	1989	230	116	1161	840	32	7	10780	5590	10	–	–	757	223	128	–	5	1	–
Knox,	37752	900	212	114	8607	2722	144	77	25413	4125	1817	1604	18	2116	667	322	10	35	10	103
Lincolnville,	21122	1213	450	278	9704	3515	548	192	44833	4250	392	–	–	3128	848	220	–	–	–	–
Montville,	34373	2221	478	313	19833	3554	416	–	52758	4520	800	1000	300	3493	700	400	–	–	–	–
Morrill,	23508	643	310	181	4269	1084	284	60	19000	840	288	625	33	1450	330	139	–	15	8	56
Northport,	9300	269	170	119	3835	1258	239	–	7360	480	218	–	–	1140	198	106	25	–	–	–
Palermo,	24795	636	588	232	9991	2007	316	228	29610	1569	25	440	123	2113	566	245	–	10	–	40
Prospect,	10464	618	587	297	3514	1056	–	52	18755	–	265	20	–	1538	320	221	–	–	–	–
Searsport,	21390	3435	1631	1351	5130	2139	–	45	36830	75	699	60	–	1496	309	329	10	30	25	150
Swanville,	9000	2000	1200	200	2500	2100	200	–	22640	500	1100	–	–	1000	300	295	–	7	2	23
Troy,	39691	492	316	203	9856	2373	174	3	35880	5580	1462	74	133	3128	858	413	–	–	–	–
Waldo,	16510	733	410	115	2538	1294	330	–	13400	3500	870	110	–	1000	255	210	–	12	–	30
Winterport,	67265	955	800	400	10801	2970	–	–	45335	–	1450	–	–	2036	387	138	–	–	–	–
	359697	17492	7994	4450	101384	30573	3230	671	372763	32718	10519	3973	687	26886	6503	3560	45	182	116	643

WASHINGTON COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Alexander, . .	15	174	164	68	41	423	–	–	–	1368	95	–	61	89	42	51	104	39	940	1730	773
Centerville, . .	7	29	62	8	26	186	–	–	–	329	14	–	23	6	12	12	17	–	157	105	2
Cherryfield, . .	10	81	170	30	55	480	–	–	–	700	429	–	60	16	95	10	50	–	967	80	15
Cooper, . . .	8	106	173	120	48	377	–	–	–	1154	77	–	58	18	61	98	172	14	308	1108	604
Danforth, . . .	5	76	86	36	59	313	–	–	–	1000	18	–	31	20	36	74	597	41	44	3249	1539
Jonesborough, . .	16	80	147	43	54	326	–	–	–	978	102	–	47	10	33	–	80	–	726	–	5
Lubec, . . .	5	209	444	145	78	1323	–	–	–	2476	221	–	40	12	61	–	72	–	913	632	7
Marion, . . .	2	21	33	18	20	83	–	–	–	166	20	–	15	5	9	–	8	–	95	88	27
Pembroke, . . .	9	163	336	114	58	829	13	55	20	2968	247	10	188	38	159	50	25	–	3185	2612	348
Robbinston, . .	24	167	235	87	50	583	9	6	–	1880	184	–	69	28	73	67	230	59	1872	1486	1101
Wesley, . . .	6	99	119	50	42	168	–	–	–	516	39	–	100	2	38	120	95	28	200	761	332
Whiting, . . .	4	50	100	20	50	281	–	–	–	843	10	–	40	10	25	–	–	–	700	50	75
Codyville plantation, .	2	32	30	36	34	177	–	–	–	531	32	–	18	10	15	28	30	15	100	482	120
Big Lake plantation, .	1	10	7	10	18	70	5	–	–	125	30	–	9	–	–	50	100	–	–	300	180
	114	1297	2106	116	583	5619	27	11	20	15034	1518	10	719	264	659	552	1580	196	10307	12683	5118

WASHINGTON COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Alexander, . .	11210	699	112	54	1623	707	–	232	14643	–	285	–	–	593	137	80	2	2	–	–
Centerville, . .	940	47	72	14	23	78	27	–	1135	–	–	–	–	46	29	27	11	–	–	–
Cherryfield, . .	6788	654	702	275	460	549	2000	18	14756	100	–	–	–	225	120	180	10	7	10	27
Cooper, . . .	8652	575	297	68	272	448	93	–	13330	75	72	105	9	395	130	76	4	–	–	–
Danforth, . . .	4262	385	34	25	60	447	10	4	8400	530	–	56	20	477	56	62	4	–	–	10
Jonesborough, . .	5931	642	68	63	219	479	110	112	14700	–	–	–	–	361	24	49	17	–	–	–
Lubec, . . .	9321	2211	702	225	101	921	–	41	16650	–	–	17	5	972	31	52	–	33	–	74
Marion, . . .	2250	198	105	12	138	130	15	–	3400	–	–	–	–	99	54	25	25	12	14	25
Pembroke, . . .	14561	1963	484	140	309	917	15	10	24414	80	120	–	–	245	108	148	38	20	2	–
Robbinston, . .	16216	3484	171	86	547	911	34	25	26371	105	142	–	57	1290	196	159	2	1	3	5
Wesley, . . .	4200	278	56	31	75	262	366	–	10835	100	50	–	–	187	50	24	9	–	–	–
Whiting, . . .	2500	250	100	100	–	500	150	–	15000	–	200	–	–	500	20	40	30	20	–	50
Codyville plantation, .	1050	1075	95	–	68	98	180	–	1700	–	–	–	–	60	13	10	–	5	–	13
Big Lake plantation, .	1000	80	70	–	80	70	–	100	500	–	20	–	–	30	20	–	–	–	–	–
	97381	12541	2868	1093	3975	6517	3000	542	165634	1790	889	178	91	4374	988	932	152	100	29	189

YORK COUNTY.

Towns.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.
Acton, . . .	11	221	475	437	260	783	–	–	–	2369	100	–	176	36	164	7293	1340	295	1398	1482	–
Biddeford, . . .	14	177	521	79	144	393	3	–	7	1455	76	–	303	34	401	6060	363	41	3142	2046	12
Kittery, . . .	11	132	338	170	238	330	–	–	–	1000	150	–	240	50	120	4121	20	30	400	40	–
Limington, . . .	21	281	590	315	300	750	154	–	–	2200	–	–	274	47	251	5000	1500	500	250	4000	–
Newfield, . . .	19	216	327	275	224	435	–	–	–	1415	81	–	202	38	126	7893	1153	118	87	1894	–
Parsonsfield, . .	16	246	684	1101	462	819	18	6	57	1503	147	–	304	69	246	9714	3396	285	1125	3468	33
Saco, . . .	22	206	818	119	276	801	8	–	–	2690	68	–	523	39	423	8507	304	36	3948	1271	–
Shapleigh, . . .	12	250	500	205	325	485	–	–	–	1460	65	–	142	49	131	5245	275	105	250	1565	–
Wells, . . .	11	240	581	206	460	1336	29	4	–	4680	208	–	280	53	159	10030	253	174	4925	1006	10
	137	1969	834	2907	2689	6132	212	10	64	18772	895	–	2444	415	2021	54863	8604	1584	15525	16772	55

YORK COUNTY, (Continued.)

Towns.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.
Aeton, . . .	16488	578	646	168	17198	1526	766	–	27104	9731	–	1751	198	2052	578	58	–	–	–	–
Biddeford, . . .	24162	1395	2266	653	6101	1940	200	185	25222	610	164	112	12	2562	1037	98	–	3	5	10
Kittery, . . .	15800	660	1200	320	2904	1560	300	150	26000	430	200	20	3	2410	205	50	–	–	–	–
Limington, . . .	15000	1000	500	300	10000	2000	1000	–	20000	5000	–	1000	300	2000	1000	300	–	–	–	–
Newfield, . . .	17418	534	870	210	11211	1210	929	–	28028	3483	20	800	456	1782	–	–	–	–	–	–
Parsonsfield, . .	27024	1404	879	417	12677	1455	1542	–	17378	5137	150	2880	180	1618	1149	207	9	–	–	14
Saco, . . .	28877	1818	1369	1538	12100	3077	489	666	62170	175	50	827	28	3993	1070	160	3	29	6	118
Shapleigh, . . .	13850	445	300	55	2410	1670	485	–	40842	1175	84	1345	300	1242	450	75	–	15	12	55
Wells, . . .	29674	249	9557	154	11067	2026	647	389	22645	100	–	–	–	1922	849	18	–	9	10	12
	188293	8083	17587	3815	85668	16464	6358	1390	269389	25811	668	8739	1477	19581	6328	966	12	56	33	209

AGGREGATE RETURN OF AGRICULTURAL STATISTICS IN THE SEVERAL COUNTIES, 1863.

Counties.	Number of bulls.	Heifers under four years old.	Cows four years old and upwards.	Steers under four years old.	Oxen four years old and upwards.	Number of common mixed or native sheep.	South Downs and grade South Downs.	Improved long-wooled sheep.	Merinos and grade merinos.	Pounds of wool produced.	Number of wool skins.	Pounds of dressed flax produced.	Swine, without distinction of age, sex or breed.	Colts under four years old.	Horses four years old and upwards.	Number of bushels of Indian corn produced.	Bushels of wheat.	Bushels of rye.
Androscoggin, .	76	1154	2723	1390	2078	5482	552	952	1321	26849	1094	105	1232	281	1144	35632	5410	2222
Aroostook, .	57	807	1085	548	503	4247	15	39	–	13635	702	72	959	256	611	1202	15146	2892
Cumberland, .	161	2305	5446	1506	2414	8362	89	281	35	26237	881	146	2774	445	2502	84616	11806	2810
Franklin, .	92	2193	2785	2682	1920	19560	559	1718	14315	106552	2762	1705	1174	427	1367	29004	18176	1242
Hancock, .	108	1284	2612	854	1180	10941	307	54	23	35694	4084	4	769	492	638	2640	2475	295
Kennebec, .	243	4043	9557	4740	4125	39949	2011	1663	2941	111706	6225	327	4602	1151	4627	91931	19696	4701
Knox, .	137	2184	4110	1099	1539	10392	40	16	31	33521	2118	–	2024	282	1805	14136	3528	3428
Lincoln, .	110	2552	4120	2173	2337	9182	184	352	80	29398	2630	257	1765	342	1475	25771	1845	2771
Oxford, .	413	6625	7503	7089	5487	37692	890	1691	1059	115555	2780	973	3912	1792	3272	120659	34385	14245
Penobscot, .	294	5290	8164	3660	2951	35218	579	1047	573	113539	10295	264	4203	1027	4657	41003	26563	3238
Piscataquis, .	107	1232	1768	1022	1041	10892	–	29	149	32728	481	89	941	327	919	9175	15206	353
Sagadahoc, .	62	1059	1934	965	924	5265	61	415	2	18204	1336	112	822	133	669	11875	1403	788
Somerset, .	229	4980	7792	6178	4301	47745	844	1618	42912	261268	3064	1402	8132	1396	3788	73227	36519	5838
Waldo, .	185	2804	4469	2730	2012	21292	501	1029	548	69410	4554	43	2123	622	2901	22556	13757	1716
Washington, .	114	1297	2106	116	583	5619	27	11	20	15034	1518	10	719	264	659	552	1580	196
York, . .	137	1969	834	2907	2689	6132	212	10	64	18772	895	–	2444	415	2021	54863	8604	1584
	2552	41778	67008	39659	36085	277970	6881	10925	64073	1028102	44129	5509	38595	9652	33055	618842	215899	49319

AGGREGATE RETURN OF AGRICULTURAL STATISTICS, ETC., (Continued.)

Counties.	Bushels of barley.	Bushels of oats.	Bushels of buck-wheat.	Bushels of potatoes.	Bushels of turnips.	Bushels of carrots.	Bushels of beets.	Bushels of apples.	Tons of upland hay.	Tons of interval hay.	Tons of bog and salt hay.	Pounds of butter.	Pounds of cheese.	Pounds of honey.	Pounds of maple sugar.	Gallons of maple syrup and molasses.
Androscoggin,	13894	48575	325	158666	9107	3013	2411	56321	13071	3781	516	244717	69609	2825	506	280
Aroostook,	5159	56046	22679	55761	17931	520	316	1082	5753	610	10	81475	8497	970	2225	614
Cumberland,	20951	44366	478	252208	15103	9197	2795	147482	24504	2726	1715	379897	51838	3615	2012	410
Franklin,	18486	54190	1533	125647	8548	1697	1009	82803	20768	2543	1834	145595	37919	6012	2790	3720
Hancock,	14950	13193	390	87854	14767	4796	1737	7914	7538	950	96	134970	3854	2751	318	50
Kennebec,	97838	118617	1855	553290	26348	9098	8123	249440	52119	5343	741	575513	133186	14872	3058	1824
Knox,	21326	18880	188	154858	21528	3571	5317	38306	15805	1582	1527	332275	18177	1581	524	29
Lincoln,	37060	20912	214	158952	11900	2452	13030	49590	20397	3932	2794	295594	7866	2381	1076	166
Oxford,	18071	117209	8283	432456	21815	8457	2624	200483	33794	11882	3632	479386	168651	7070	33560	5263
Penobscot,	78619	171061	7477	929499	29396	12125	5041	91789	41848	3517	1043	252043	84040	36328	5431	1015
Piscataquis,	17682	55681	3333	44164	5769	1047	385	25895	9823	184	65	106706	26220	6584	1426	295
Sagadahoc,	18903	10466	136	73577	10561	1794	2967	25443	12382	1679	998	137217	2428	1715	21	26
Somerset,	106903	167542	6128	603165	21798	4777	2914	193812	59885	4026	1567	485604	149337	25950	9306	4021
Waldo,	45101	64305	603	359697	17492	7994	4450	101384	30573	3230	671	372763	32718	10519	3973	687
Washington,	10307	12683	5118	97381	12541	2868	1093	3975	6517	3000	542	165634	1790	889	178	91
York,	15525	16772	55	188293	8083	17587	3815	85668	16464	6358	1390	269389	25841	668	8739	1477
	540775	990448	58795	4255478	252087	90993	58027	1361387	370238	61343	19141	4458778	821970	124830	74843	19968

AGGREGATE RETURN OF AGRICULTURAL STATISTICS, ETC., (Continued.)

Counties.	Value of poultry and eggs produced.	Bushels of beans.	Bushels of peas.	No. of sheep killed by wild animals.	No. of sheep killed by dogs.	No. of sheep injured by dogs.	Amount of damage to sheep by dogs.	Remarks.
Androscoggin, .	$12243 00	3914	1196	2	34	55	$198 00	Returns received from 6 towns—8 wanting.
Aroostook, .	4909 00	725	1499	6	5	–	13 00	" " " 11 towns and plantations—52 wanting.
Cumberland, .	26834 00	8777	1977	6	49	4	251 00	" " " 12 towns—13 wanting.
Franklin, .	12771 00	4636	1678	12	37	40	144 00	" " " 10 towns—16 wanting.
Hancock, .	13810 00	2510	2201	249	211	54	962 00	" " " 15 towns—25 wanting.
Kennebec, .	53423 00	13801	4387	2	142	62	588 00	" " " 20 towns— 9 wanting.
Knox, .	24050 00	3059	1621	14	33	21	153 00	" " " 12 towns— 5 wanting.
Lincoln, .	24908 00	4224	2399	2	158	89	610 00	" " " 11 towns— 5 wanting.
Oxford, .	28710 00	9070	3440	222	121	30	416 00	" " " 27 towns and plantations—15 wanting.
Penobscot, .	34816 00	10090	10808	77	107	87	601 00	" " " 29 towns—34 wanting.
Piscataquis, .	7324 00	2299	2841	67	7	8	27 00	" " " 12 towns—14 wanting.
Sagadahoc, .	4673 00	2234	1052	–	25	49	103 00	" " " 8 towns— 3 wanting.
Somerset, .	38899 00	15169	9717	128	204	56	787 00	" " " 24 towns and plantations—13 wanting.
Waldo, .	26886 00	6503	3560	45	182	116	643 00	" " " 16 towns—10 wanting.
Washington, .	4374 00	988	932	152	100	29	189 00	" " " 14 towns and plantations—36 wanting.
York, . .	19581 00	6328	966	12	56	33	209 00	" " " 9 towns—17 wanting.
	338211 00	94327	50274	996	1371	733	5904 00	Returns received, in all, from 237 towns and plantations, and from 268 they are wanting.

ON THE MANUFACTURE OF CHEESE

AS AN ARTICLE OF EXPORT, BY MEANS OF ASSOCIATED DAIRIES.

A large portion of my report last year was occupied with a consideration of the dairy, and more particularly with the manufacture of cheese. The extensive introduction into this State of a branch of industry so profitable as this is at the present time, and promises to be in the future, appears to me a matter of so great importance, that it is deemed a duty to submit some farther remarks on the subject at the present time. In order to correct any erroneous impressions previously received, to obtain additional facts, and to ascertain with certainty the developments of another year, I again went over the principal cheese dairying districts of the United States during the past summer. Although comparatively little was learned to add to the report of last year, in regard to the best process of manufacture, a good deal was ascertained regarding the importance of dairying as a branch of rural industry, and the progress of associated action in carrying it on.

In the first place, there can be no doubt that it is, at the present time, profitable beyond any other branch of stock husbandry.* The belief is entertained by many of our most intelligent farmers, that the amount of vegetable food which will produce one gallon of milk when fed to a good milk cow, as now used by farmers generally in the rearing of young stock to sell, does not actually secure to them a return of more than four cents; many set it as as low as three cents and a few as high as five cents. Now a gallon of good milk will make a pound of cheese, and good cheese has been bringing, for a twelve-month past, from twelve to sixteen

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* The opinion was confidently expressed by many farmers on the Western Reserve, (Ohio) where cheese-dairying and sheep-husbandry have long been the leading pursuits, that at the present prices of both, cheese-making was decidedly the more profitable of the two.

cents ;* and some has been sold even higher still. The necessary cost of manufacture is less than two cents per pound, and, with the best of facilities, but little exceeds one cent ; thus leaving the dairyman from ten to fourteen cents for the same food which has brought to our stock farmers only four or five cents ; and even allowing that the price of cheese should fall to former rates, the gain would still be very considerable.

An inquiry naturally arises here, if the farmers of Maine become dairymen who will buy all the cheese? To which it may be replied that they will not all do so ; for the profitable production of milk demands good pastures abounding in springs of pure water, and yielding a pretty steady supply of grass, together with facilities for making good the very possible deficiences caused by droughts, by means of a supply of other succulent food. It is not all the land upon which sheep and cattle can be reared, nor where corn and wheat are plentifully produced which can be judiciously devoted to the dairy. There is a good deal of land in Maine which will do better for sheep and for other uses than for the production of milk, and there are immense districts throughout the United States, particularly in the South and West, where dairying will never prevail to any extent, for the simple reason that farmers there can buy butter and cheese to better advantage than to make it. At the same time we have hundreds of thousands of acres of land in Maine where good milk can be produced as cheaply, considering the price of land and labor, as it can in Vermont, New York, or anywhere else.

Next, what and where is the market for cheese? First, some can be disposed of at home, in place of the two millions of pounds or thereabouts which has been annually brought into the State for years past, and thus a leak of two hundred thousand dollars, more or less, be stopped. This is an item worth considering, but it is not all. Cheese is exported to the West Indies, to South America, to California, and to other places. Formerly a large quantity went to the Southern States. Let us hope that before long we may send thither a great deal more than ever before. When in the Western Reserve last August, I was informed by a large dealer that the call for cheese from Cincinnati, Louisville, and

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* At this present writing, (first week in November,) I notice quotations of factory cheese, in New York, 14½ to 16 cents.

other places, to be sent South was urgent and so large as to affect prices considerably even there. But the principal market abroad is in England. In Great Britain there are thirty millions of inhabitants, more or less, and they eat a great deal more cheese than the same number of Americans, whom we can supply with manifest advantage to them and to us. The manufacture of cheese has long been pursued there extensively. The county of Chester has been famous for centuries, insomuch that it is usually called Cheshire, which is merely a slight contraction for Cheese-shire. The northern counties of England and the neighboring counties in Scotland have also been largely engaged in it. But the price of land is so dear that no farmer in England can produce a gallon of milk at a less cost than six pence sterling, — equal to twelve cents of our currency when exchange is at par, and considerably more now that gold is at a premium. Of course no dairyman there can sell cheese for less than the cost of the milk and the pay for making it up. It is also a fact that meat sells in Great Britain at much higher prices than it does here, and the British farmers have their hands full, and more too, to make meat enough for home consumption, and large quantities of cured meats, beef, pork, bacon, &c., are annually imported. What reason, then, can be imagined why we may not furnish them all the cheese required, with mutual advantage? Our facilities are such that we can surely make it cheaper than they. There is no difficulty in sending it thither in prime condition, and at a cost of only about one cent per pound; including freight, insurance, commissions, and all charges attending transportation.

It required a long time to create the demand which now exists in England for American cheese, and to Herkimer county, New York, belongs the credit of accomplishing it. It was mainly effected by bringing a high degree of skill to bear upon the manufacture generally, thus producing not only a good article, but one uniformly good, or as near uniform as is possible, when made in many families. Cheese had been sent abroad in small amounts for many years, but when once, by good quality and uniformity, it had secured a firm foothold, the amount exported increased with astonishing rapidity. By gradually increasing steps it had come to be nine millions of pounds in 1859. In 1860 it amounted to twenty-three millions; in 1861 to forty millions, and the amount has increased steadily since then.

That this export demand governs the price of cheese in this country is demonstrated by the fact that in June, 1862, prime cheese was bringing, in Herkimer county, eight cents per pound, but as soon as specie payments were suspended and gold bore a premium, the price of cheese advanced with even step; when gold fell, the price of cheese receded, when it rose again, cheese advanced, and all the while just in proportion to the current rate of exchange; and this shows, satisfactorily enough, that to cancel indebtedness or to pay for goods purchased in England, the cheese was as good as the gold, and answered the same purpose exactly. With a market of so great capacity open to us, it is as certain as anything in this uncertain world, that the manufacture of cheese in this country will increase immensely, and I see no good reason why the farmers of Maine may not come in for a share of the profits as well as to go without it.

On the other hand it must be admitted that we are not in possession of the requisite skill, and it cannot be diffused through a large number of families at short notice. Should the manufacture be extensively introduced into the families of Maine farmers, several years of study and of practice must elapse before the product, as a whole, would compete successfully in the foreign market; and at the same time it would greatly increase household labors, and add heavily to burdens already heavy enough.

These have the look of serious obstacles, and if they be insurmountable ones, cheese-making must necessarily make very slow progress. But it is believed that the plan alluded to in my report of last year (pages 81–82) is capable of effectually obviating them both. The advantages of association in the conduct of various branches of art and manufactures, are sufficiently understood and appreciated; but the farmer has hitherto considered himself excluded from a participation in them by reason of the nature of his occupation. To a considerable extent this is undoubtedly true, but it admits of some exceptions, and here is a notable one, not merely in theory but abundantly proved so by facts. In the manufacture of cheese, considerable time must necessarily elapse after the milk comes in before the curd goes to press. The process cannot be hastened without serious injury; during much of this time, where only the milk of ten to fifty cows is employed, there is little or nothing to do but to note the progress making, and with the proper facilities it is scarcely more work to make up the milk of fifty cows than the milk of ten; and so it is comparatively little more to make up that of five hundred than of fifty. About ten years ago, Jesse Williams, living near Rome, Oneida county, New York, conceived the idea of turning this to practical advantage by making up the milk of his neighbors into cheese, together with his own. The plan worked well, and before long he increased his facilities so as to make up the milk of four hundred cows or more. Farmers are usually cautious, and slow in changing long established customs and practices, but the advantages of this new notion were so evident and indisputable that gradually similar establishments were set up, until when I was there last year it was said there were ten of these "cheese factories" within a circle of about ten miles.

At the time of my visit the present year, the number was found to be largely increased, and so recently had many of them been established that it was not easy to ascertain with certainty how many were actually in operation. From various sources, however, a list was obtained of the following:

Rome, (Jesse Williams,)	600	cows.
do (Spencer Allen,)	500	"
do (Greenfield,)	400	"
do (Cady & Chandler,)	300	"
do (Crosby & Huntington,)	400	"
Delta, (F. Smith,)	600	"
Lee, (W. D. Sexton,)	500	"
do (Geo. Wood,)	300	"
Lee Centre, (P. Charton,)	400	"
Florence, (Saveny & Coventry,)	500	"
West Branch, (Williams,)	300	"
Westernville, (Hill,)	300	"
Verona, (Hill,)	300	"
do (Buck,)	500	"
do (Weeks,)	400	"
do (Durham,)	300	"
Verona Centre, (Lampher,)	200	"
New Hartford, (Sherman,)	300	"
Trenton, (H. J. Fowler,)	800	"
do (H. Miller,)	600	"
do (W. W. Wheeler,)	300	"

Deerfield, (Lewis & Horn, superintendents,) .	700 cows.
Marcy, (Wilcox,)	600 "
do (Tanner, Wood & Ashly,) . . .	1000 "
Kirkland, (Blackstone,)	500 "
Hampton, (Williams, Adams & Derry,) . .	300 "
Lowell, (H. S. Rose,)	500 "
Remsen, (W. Mitchell,)	400 "
do (D. Thomas,)	400 "
Holland Patent, (T. Pierce,) . . .	600 "
Steuben, (W. Brooks,)	400 "
Floyd, (J. Davis,)	350 "
Vernon, (Clark,)	350 "
Boonville, (Jackson,)	600 "
Stittville, (J. W Rathbone,) . . .	700 "
South Trenton, (Whitaker & Curry,) . .	600 "
Whitestown, (Williams & Smith,) . . .	650 "

Besides the above, all of which are in Oneida county, five are in operation in the adjoining county (Herkimer)—all established the present year. Mr. Frazee, who last year carried on the one mentioned in the above list as Crosby & Huntington's, last spring started one in Cortland county intended for fifteen hundred cows, and establishments upon the same plan are known to have been started in other States during the present year.

Thus it will be seen that a radical change in the system of cheese manufacture has been extensively introduced, and is making rapid progress. The advantages of the new system and an account of its details are very ably and fairly stated by X. A. Willard, Esq., of Little Falls, New York, in a paper on "The Associated Dairies and Cheese Manufactories of New York," written for the Transactions of the New York State Agricultural Society, proof sheets of which he has sent me. Mr. Willard, who is well known as one of the most intelligent and successful dairymen of Herkimer county, was so kind as to accompany me in visiting several of these establishments, and I am happy to acknowledge my indebtedness to him for valuable assistance in studying their details and operation, and for numerous other courteous attentions, as well as for the extensive quotations from his paper, which we give below. Mr. Willard says:

"The advantages claimed for the factory system are superior quality, uniformity, higher prices, saving by buying at wholesale such materials as salt, bandage, annatto, boxes, etc., and finally, relieving the farmer and his family from the drudgery of the manufacture and care of cheese.

It is not pretended that a better quality of cheese can be made at the factory than in families, but that it is quite as fine as the best, and therefore above the average of that manufactured in small parcels. Some of the causes which conspire to depreciate the quality of cheese when made in single dairies are not present in the factory system.

The agent, or superintendent, makes it his business to see that all parts of the work are properly performed. He employs skillful workmen; his interest and reputation are at stake, prompting him at all times to do his best. He knows that neglect or mistakes will not be tolerated, and the desire to satisfy persons interested, in order to secure their patronage, stimulates him to make every exertion to build up and sustain a reputation for "fine goods." He has every convenience at hand for manufacturing to advantage, and makes the business a specialty and a sole employment. He is not liable to be disturbed with other matters which might serve to call his attention away from time to time, to the prejudice of the immediate work at hand.

The same rule must hold good with him as among those engaged in other professions and arts, for he who gives his whole attention and energies in a certain direction is likely to become more skilled, and arrive nearer to perfection in his calling, than he who is striving to do many and diverse things well at the same time; more especially in cheese manufacture under this system, as a high degree of skill is expected, and jealous and interested eyes are daily watching and noting every mistake and shortcoming. Uniformity and fine quality are therefore more likely to obtain under this system, and whatever progress can be made toward improvement, will naturally develop itself more rapidly here than among persons scattered over a broad extent of country, and who are so occupied with a variety of work as to have little time to spend in the improvement of any one particular branch.

The factories, so far as we are acquainted, have acquired a high reputation for fine quality and uniformity. At some of these establishments we have seen a large number of cheeses, making in the aggregate more than one hundred thousand pounds, so uniform in appearance as they lie on the tables, that the most practiced eye could scarcely detect any difference in their manufacture. Such a quantity of cheese, uniform in size and quality, will usually command a higher price in market over that of single dairies, from the fact that in the latter an allowance is always made by the purchasers for unequal or imperfect cheese. Factory cheese generally sells at a price above that of single dairies equal to the whole cost of manufacturing. In November, 1862, long dairies, made in families, of good quality, were selling at from ten cents to twelve and a half cents per pound, while factory cheese, of Oneida, sold at fourteen cents per pound, and the large size, those weighing from 700 to 1,000 pounds each, brought in some instances as high as seventeen cents per pound.

We have alluded to some of the causes that operate to increase the price of well made factory cheese over that of private dairies. Another may be added, in the less time, trouble and expense of purchashing. The whole quantity made from six hundred or a thousand cows can be bargained for and bought at no more time and expense than a "twenty cow" dairy. This item amounts to a considerable sum in the aggregate, as experts are employed by the principal commission houses in cities, by shippers and dealers, to select and purchase cheese, under salaries ranging from $500 to $1,000 per year. Others, again, get a certain percentage on what they buy: These sums, of course, come out of the producer, and hence by so much must depreciate the price of cheese. Another saving is also made in buying the materials used, such as bandage, salt, annatto, boxes, etc., at wholesale instead of retail.

We come now to consider the most important advantage to farmers in this union arrangement. It is the relief from the drudgery of cheese making, and the constant care and attention necessary in properly curing and fitting the cheese for market. It would be difficult to estimate this in dollars and cents, since health enters into the account more largely than is generally suspected.

It is believed, and we speak advisedly, that the old method of cheese making has done more to injure the health of women in cheese dairying districts than any other cause. Much of the work about the dairy ought to be performed by men, but too often the manufacturing and most of the care of cheese are left wholly to females, overtasking their strength by hard and exhaustive labor, thereby laying the foundation of weakness and disease.

As the same process is to be gone through with in manufacturing cheese, whether the quantity of milk be large or small, and as nearly the same time also is occupied, it will be seen that what requires the labor of a great many persons to do when cheese making is divided up in families, can be accomplished with but a few persons on the factory system, some five or six being sufficient to do the work about an establishment manufacturing the milk of a thousand or more cows.

The principal objections urged against cheese factories are: difficulty of detecting adulterated milk, the carrying of milk to the factory and liability of sour milk, difference in quality of milk arising from the manner in which cows are fed and managed, and the loss of the whey. As the milk is weighed or measured at the factory, and each credited with the amount daily furnished, it is evident that when there is a considerable quantity a dishonest person could add water, and thus increase the amount to be credited. Such cases have occurred, and the individuals cheating have been summarily expelled from the association.

Some object to the labor and trouble of carrying milk to the factory, and the necessity of keeping to regular hours for its delivery under all circumstances of weather, inconvenience, and disability from other causes, since no delay at the factory can be made for the milk of a single dairy without hazarding the acidity of a large quantity, at least that contained in one vat, besides deranging, in some degree, the regular factory work.

Without extra care and cleanliness as to the pails and milk cans, there is liability of sour milk from time to time, which of course would not be received at the factory. The cans for carrying the milk, it may be observed, are somewhat difficult to cleanse and to keep sweet, and the confinement of the milk, and its agitation while being carried, in hot weather, renders it susceptible to change, especially if there be the least taint of acidity about the cans.

Then there is the loss of whey, which is regarded by some to be an important item in the way of pork making, or as a feed for cows, for the whey is usually the property of the person who runs the factory; but were it given to the farmer, as it sometimes is, there is the trouble and expense of carting it home."

Regarding the organization, selection of a site, &c., Mr. Willard says:

"Cheese factory associations are organized in neighborhoods of ten or a dozen or more farmers.

When it is proposed to start a factory, several persons who are neighbors to each other get together and talk over the matter among themselves. If enough are found willing to turn in their dairies together, so as to make a fair start, (say three hundred cows,) a committee is appointed to look further into the matter, to visit factories, and get all the information on the subject that can be had. A favorable report from the committee being had, they then organize, choose directors, and adopt some general rules or plan for the guidance of the association. The next step will be the selection of some experienced cheese maker as superintendent, and the place for the erection of the factory building.

Generally some person proposes to put up the buildings on his own account, and to manufacture and take care of the cheese at a fixed price per pound, demanding a contract on the part of the farmers to furnish the milk of the requisite number of cows for a certain number of years.

The milk of about four hundred cows, it is believed, is the smallest quantity that can be employed by the manufacturer, (when cheese making is his sole business,) in order to obtain a fair living compensation for services, while the milk of a thousand cows can be manufactured at but little extra expense comparatively.

In choosing a place for the erection of the factory buildings, two requisites are sought — good water and convenience as to access and distance for the dairies furnishing the milk. The site, above all, should command an abundance of pure cool spring water, and the supply should be unfailing as well as abundant. This is regarded by those who have had longest experience at the business as imperative. Its temperature should not be above 50° Fahr. unless the supply is very plentiful, in which case a temperature of 52° or 53° might serve.*

Even in family cheese making a considerable quantity of water is needed in various ways about the dairy, for cooling milk, cooking the curd and keeping the utensils and buildings clean and

* At one factory which I visited in Ohio, the spring had failed; consequently, not having cold water to reduce the temperature of the milk it was made up both night and morning, thus involving double labor, and even more, for it required longer cooking, and (not being acquainted with the use of sour whey with milk too sweet) an inferior product also.—[S. L. G.]

sweet; but for the factory the quantity of water should be abundant and unfailing. It is usual to have a considerable stream of water passing under the manufacturing room, so as to carry off the drippings of whey and refuse slop, so that there be no accumulation of filth or taint of acidity hanging about the premises. Where whey and slop are allowed to collect from day to day about the milk room, the stench at times becomes intolerable, and must do great damage to the milk, which absorbs taints of every character with great readiness. Hence means must be taken to have all the refuse matter swept beyond the reach of the premises.

Some factories are being built where dependence for water is placed upon wells of large capacity, but these are as yet experiments to be tried. At all events, it will be seen that much more labor will be required, with greater liability to taints, than where spring water, passing in a considerable stream under the building, can be had.

Where it is admissible, the manufacturing room should be located with a bank on one side, several feet in height, and forming a road on which the teams drive and deliver the milk through the receiving windows, thus giving the proper descent to the weighing or measuring apparatus, and from thence to the vats. Where the bank is wanting, a platform must be raised for the purpose indicated.

If it is proposed to employ some one person to collect and deliver all the milk, then the factory should be located at a point where the work can be effected at the least trouble and expense.

The buildings to be erected will consist of a manufactory or place for making the curd, a press room, dry house or curing rooms and an ice house.

The dry house should be a separate building, so as not to be affected by dampness, and in case of fire, that the cheese may be more readily removed. At one of the establishments near Rome, Oneida county, recently erected, and where the milk of six hundred cows is used, the size of the buildings is as follows: Manufactory, 26 by 26 feet; story and a half; press room, 39 by 13 feet; dry house, 26 by 100 feet; two stories high. Cost of the buildings, with fixtures, about $2,500.

These buildings consisted in nothing but frames shingled and covered with rough siding, and even not lathed and plastered.

The curing house, where it is not proposed to lath and plaster should be sided with matched floor plank, and provided with ventilators at the sides and top.*

One of the best arranged plans for building and fixtures that I have seen is that of the new factory of Frazee's, at Truxton, Cortland county, which goes into operation the present year. Mr. Frazee formerly conducted a factory near Rome, and had there made a considerable improvement over the original or early built factories. The new buildings are a great improvement over the Rome establishment.

This factory has a capacity for manufacturing the milk of fifteen hundred cows, and was expected to start with that of twelve hundred.

Mr. Smith, who has charge of the manufacturing department of the Truxton factory, in a note, says: "The manufacturing room is 32 by 40 feet, and contains seven vats, 15 feet long by $3\frac{1}{2}$ feet wide, of six hundred gallons capacity each. There will be two places by which the milk can be emptied, so as to keep the wagons waiting the least possible time. The milk will be *weighed* instead of being measured. Adjoining the work room is the press room, 50 by 16 feet; there are ten presses on each side. The sink containing the curd stands on rails, so as to be run into the press room opposite the presses. There is a space of four feet behind the sink, so the hands can work the curd and not interfere with those who are dipping it out.

"The engine, of eight horse power, stands in a separate building. There is a (horizontal) main steam pipe, six feet from the floor, to which are attached six steam pipes connecting with the vats; the hands can in this manner go around either end of the vats.

"The buildings are on a level, so the cheese can be run from the press room on trucks into the curing house, between the counters; no carrying of the cheese, as at the original Frazee factory.

"The back side of work room is built of masonry, and the water, fifty feet fall, brought into a large reservoir directly under the platform upon which stand the receiving cans. Under the work room is laid flagging, over which flows a stream of water to keep it free from any matter that might collect there if the soil under the building was soft.

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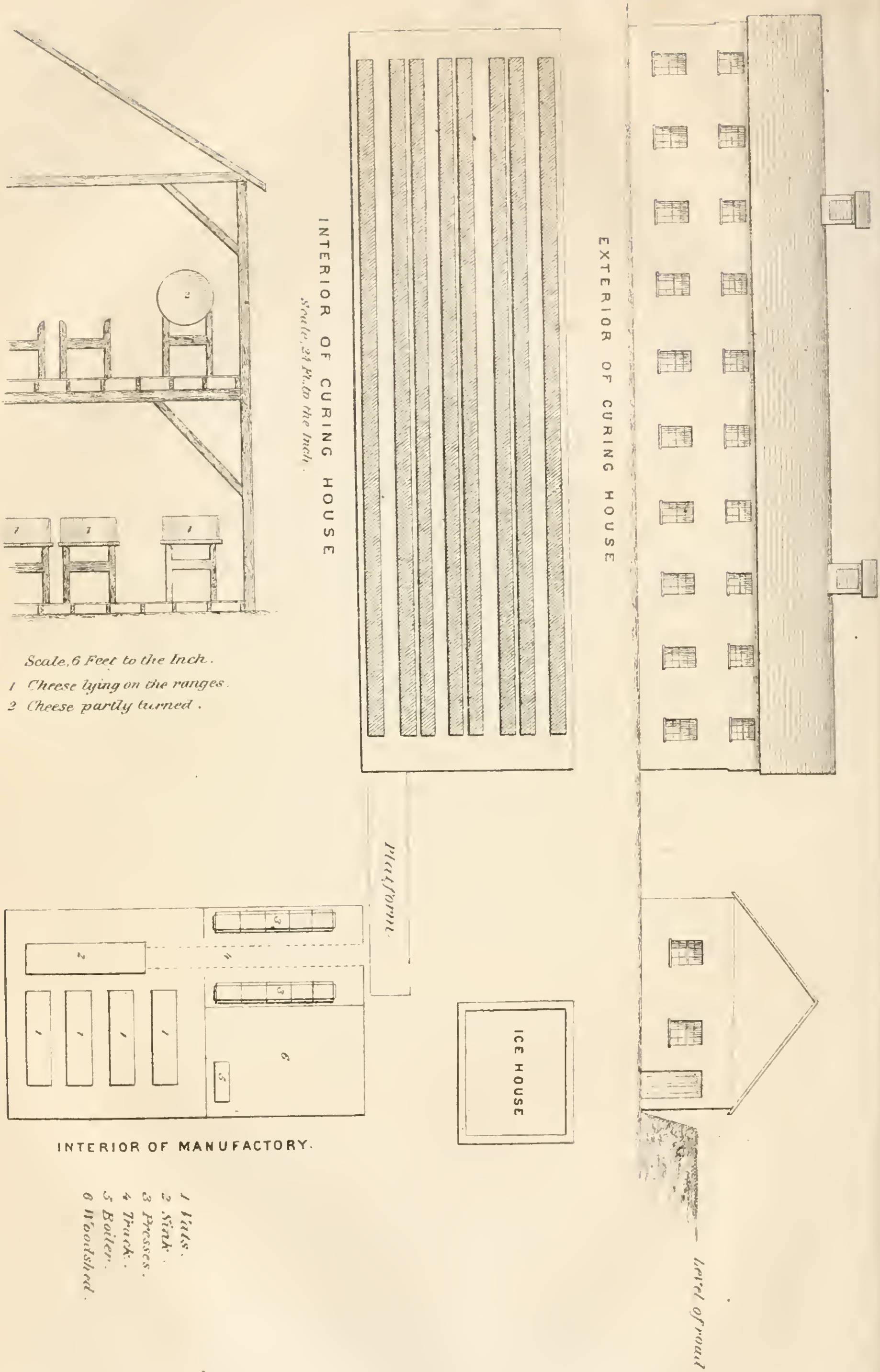
* For plan of these, see report of 1862, page 110.


EXTERIOR OF CURING HOUSE
INTERIOR OF CURING HOUSE
Scale, 24 Ft. to the Inch.
Scale, 6 Feet to the Inch.
1 Cheese lying on the ranges.
2 Cheese partly turned.
Platform
ICE HOUSE
Level of road
INTERIOR OF MANUFACTORY.
1 Vats.
2 Sink.
3 Presses.
4 Truck.
5 Boiler.
6 Woodshed.

"The whey vats will be a long distance from the buildings, for we believe the milk will absorb any impurities of the atmosphere. Hog pens will be dispensed with entirely, for past experience proves to us that if cheese is properly made there is not enough nourishment left in the whey to make it profitable for pork raising."

The accompanying cut shows the ground plan and buildings of the factory near Herkimer, Herkimer county, under the supervision of Mr. H. Farington, who for many years has been widely known throughout the dairy region as an extensive cheese dealer. The cut shows the bank alluded to, where the teams deliver the milk. The floor of the manufacturing room should incline a little towards the centre, so that, in cleansing, the slops may be discharged into the creek.

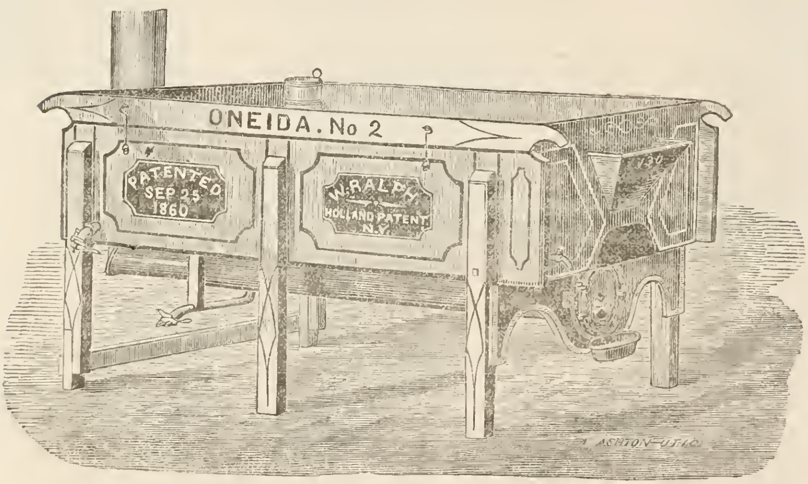
The Herkimer factory has facilities for manufacturing annually 300,000 pounds of cheese. The manufacturing room is 28 by 48 feet, and the curing house 28 by 100 feet, and two stories high. There are four tin cheese vats, placed inside an equal number of wooden vats, the milk in which is heated by steam ; each vat holds four hundred gallons.

The ice house has capacity for holding one hundred tons of ice. The cheese at this factory is pressed in a twenty-three inch hoop, and will weigh one hundred and fifty pounds each. This factory is built on the improved plan, and all the internal arrangement quite convenient.

In most cheese factories steam is used for warming the milk and cooking the curd. In some there is merely a steam boiler set in brick work and provided with pipes, while in others there is an engine also, usually of from four to eight horse power. The milk as received is conducted into vats of from four hundred to six hundred gallons capacity, each. These vats are made double, the inner one being of tin and the outer one of wood, with a space between of about two inches. This space is for the reception of water, and is provided with pipes conducting from the boiler, and so arranged that when steam is let on it may be distributed through the water as evenly as possible.

It is generally supposed to be cheaper thus to use steam, than to employ an apparatus similar to that described in the report for 1862, as the most desirable for family use ; and very probably it may be cheaper at the outset, but if Ralph's Oneida Vat and Heater are employed, (which, in some important respects, appears to me to be the preferable one,) the daily expense of fuel would be much less, all risk of explosions or other accident from steam wholly avoided, as well as the loud and very disagreeable noise caused by the steam as it is driven into the water of the outer vats.

The factory of Mr. Spencer Allen, near Rome, is supplied with Ralph's Patent Vats. There were three of them which I saw in operation when there the past summer. Their capacities were severally six hundred gallons, five hundred and forty gallons, and four hundred gallons, which served to make up the milk of four hundred and ninety-six cows. Only one of these had the hot water tank attachment, which was found to suffice for all three. My observation of the working of these vats led me to coincide fully with the opinion expressed by Mr. Allen of their superiority over the vats heated by steam.



For a detailed description of these Vats, see report for 1862, pages 99–100.

The presses at these establishments are of the simplest character, and consist in nothing but a stout iron screw, with the proper wood work attached for holding it in position, and a platform on which the hoop holding the curd rests when put in press.

Several of these presses are frequently connected together by framing the uprights of each press to stout beams, or square pieces of timber running nearly the whole length of the press room. The screws when turned up pass through the upper beam and are turned down on the cheese with an iron lever, from time to time, until the desired pressure is acquired, and the work of pressing accomplished.

When the cheese is turned in press it is bandaged with a kind of thin dressed cotton cloth, similar to bleached goods, but manufactured specially for the purpose. This style of bandage, when carefully pressed on, gives to the cheese a remarkably smooth and neat appearance. Thick, heavy bandage, it may be proper to observe, should not be used on ordinary sized cheese, as it is more liable to produce mould. The bandage having been properly put in place and the hoop slipped on, circular caps of cotton cloth, the size of the cheese, are added at top and bottom, so as to give a perfectly smooth surface to the new cheese when it comes from the press, and care is taken that it be pressed true, and that the rind be closed in all its parts, for a badly pressed cheese can never afterwards be made to assume a handsome appearance.

It is claimed that the screw can be managed more readily in pressing the cheese to a perfect shape, that it is less expensive, and occupies less room than other devices for the purpose, and hence is best adapted to factory use.

When some person is at hand to watch and attend to the pressing, the inconvenience in using this character of press is perhaps not so much felt, but in family cheese making, where help is limited, they would be considered a nuisance, for the farmer requires a press that will follow up its work, and do the pressing faithfully without watching.

At some of the factories the screw is beginning to be regarded as objectionable on this account, since they can receive no attention during the night. Hence strong presses, like 'Oyston's Herkimer County,' * are being in some places substituted. The main advantages of the screw are its trifling cost, its strength, and the small space it occupies; in other respects it is believed to be inferior to other devices for compressing the curd.

The hoop in which the cheese is pressed is of pine staves, bound with heavy band iron, and very carefully made, the inside being turned or worked down true and smooth.

A good proportioned cheese is in height about half the size of its diameter, and the hoop therefore should be high enough to conveniently hold the curd and accomplish this end. When a hoop of

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* Described and figured in last year's report, page 107.

twenty-three inches in diameter is used for cheese weighing one hundred and fifty pounds, it should be at least fourteen or fifteen inches high, and be provided with iron handles on the sides for convenience in moving and slipping it from the cheese.

Messrs. Ralph & Co., of Utica, New York, have devised and are manufacturing metal hoops, which are very convenient, and admit of a closer fitting follower than wood, which shrinks and swells. Some of them are of tin, heavily but neatly banded, while the latest pattern are of galvanized iron.

A suggestion in regard to properly constructed milk cans for delivering milk, may perhaps be deserving of a passing notice.

Cans holding from forty to sixty gallons will be of convenient size, and should be well and nicely made from the best of tin. The cover should be with a rim, and tapering so that it may be pressed into the can, and down to the milk, making a close fit. In the centre of the cover is a three-quarter inch hole for the air to escape while pressing the cover to its place; it is then to be closed with a cork. A faucet is provided near the bottom for conducting out the milk into the receiving cans at the factory, where it is weighed by the superintendent. Formerly the milk was measured, but latterly weighing seems to be in favor.

The platform where the receiving cans are placed stands higher than the vats, and as fast as each dairyman delivers milk it is weighed and conducted into the vats by merely opening the faucets. This platform commands a view of all parts of the manufacturing room, is provided with desks, and it is here the books are kept for noting the quantity of milk delivered, and the calculations made for the quantity of rennet, annatto and salt to be used for each vat of milk.

Tables and racks of convenient height for handling the cheese are arranged in the curing house, on which the cheese is placed as it comes from the press, and where it remains during the process of curing. Each cheese when it is placed on the table receives a record of its weight and date neatly marked on its bandage.

The wood best adapted for the table bed is hemlock. It should be smooth and level, and made of well seasoned stuff. Pine is sometimes used, but being more or less resinous is apt to impart something of its flavor to the cheese; the cheese also adheres to it more closely than hemlock. Wood like basswood is objectionable, doing damage to the cheese, and should not be used, for it adheres so closely to the cheese as not to be readily loosened, marring the rind and oftentimes taking out considerable portions of the cheese. It may be proper to say that the table bed, where the cheese rests, should never be painted.

The recent invention of the cheese rack is a great improvement over the table. The cheese rack consists of scantling, four inches by five inches, with the corners beveled or cut so as to be 5-sided; these are framed the proper distance apart at the ends, and set on legs of the desired height, forming a skeleton table. Round covers, of inch hemlock or pine, bound with stout elm rims, three or four inches wide, set upon the racks and hold the cheese. When the cheese is to be turned, a spare cover is placed on top, and the cheese and covers turned over; the cover now on top is removed, rubbed with a cloth, and is ready to be applied to the next cheese. The rims of the covers protect the edges of the cheese in the process of turning; and a part of the cheese, swinging down in the open space between the timbers and the rims, resting on the beveled sides, renders the operation not only easy, but it insures safety to the cheese. A large cheese can be turned with as much ease on a properly constructed rack as the loosening of a smaller cheese on the table preparatory to being turned. Large cheese are difficult to handle on a table, and are liable to have their edges broken, or in other ways marred in turning.

The sink, where the curd is drained and salted, should be convenient to the vats, movable, being provided with rollers and placed on a track leading to the press room, so that the curd may be dipped directly into the hoops where it is to be pressed.

This will not only be a saving in time and labor, but will avoid occasional losses in dropping particles of curd or spilling it by accident, which is liable to occur when it is carried by hand from one room to another. It will be scarcely necessary to observe that the whey vats should be a considerable distance from the manufacturing room; for as milk is very susceptible to taints, and is affected by the state of the atmosphere, every means must be taken to promote the most favorable condition in the milk for the production of fine cheese.

In starting a manufactory some little anxiety may be had in regard to the most suitable size of the cheese to be made. This, doubtless, may be controlled somewhat, from time to time, by the market for which the cheese is manufactured. The home trade, during hot weather, prefers medium sized cheese; but for shipping to Europe, there seems to be a growing demand for cheese of larger size.

During the season of 1862, cheese weighing from one hundred and twenty to one hundred and fifty pounds were in favor for the foreign trade; and this size is, perhaps, all things considered, most convenient for factory make. They are easily handled, and in case of accident either at the factory or in carrying to market, the loss is not so great as on the larger cheese.

The factory charge for manufacturing cheese is one cent per pound; rennet, salt, bandage, annatto and boxes, as well as the carting of cheese to market, being charged to the association and paid by each dairyman in proportion to the quantity of milk furnished during the season. All other expenses, including the care of the cheese while curing, &c., is paid by the manufacturer.

To run a factory using the milk of six hundred cows will give constant employment to at least four persons, half or more of whom may be females.

At one of the factories near Rome, New York, in 1862, the price paid for the services of a man and woman, who were the foremen of the establishment, was one dollar each per day and board; others received from two dollars to four dollars per week; and I was informed that the actual cost of manufacturing the milk of six hundred cows for the season, was seven hundred dollars. It is presumed this sum did not cover interest on capital invested for buildings and fixtures, but was the amount paid out for labor, board, fuel, &c.

From these data it will be easily estimated what amount of money can be realized from the business of manufacturing. Allowing that the 600 cows produced on an average 400 pounds of cheese each, there will be in the aggregate 240,000 pounds. The cost of a well constructed factory will not be far from $3,000.

We have, then, 240,000 pounds at one cent,		$2,400
Cost of running factory,	$700	
Interest on buildings, &c.,	180	
Annual wear and tear, or depreciation of property,	200	
	——	1,080
Profits,		$1,320

Now, for 300 cows, nearly the same expenses would be incurred, and the factory account would stand thus:

120,000 pounds cheese at one cent, . . .		$1,200 00
Expense of running factory, . . .	$700 00	
Interest on capital invested, . . .	180 00	
Annual depreciation of buildings, fixtures, &c.,	200 00	
		1,080 00
Profits, ...		$120 00

We do not pretend to give the exact figures in the above estimates, but it will be seen that a factory manufacturing the milk of a less number than 300 cows will not be a very paying business, unless the manufacturer can have most of the work performed by members of his own family.

When a factory is located in a neighborhood where all or nearly all the dairymen are on one road, some one of the number may be employed to gather up the milk of the several dairies, and deliver it at the factory. Neighbors living near each other may take turns, each delivering one day out of the week. When men are hired to gather up and deliver the milk for a neighborhood during the season, the price usually paid for such delivery is one dollar per cow.*

In cheese manufacture an important point to be considered is the proper management of the evening's milk; and in order to do this to the best advantage, the state of the atmosphere must be observed at the time the milk is placed in the vats. The milk room should be cool, airy, and free from impurities. In hot and sultry weather much care and attention must be given to the evening's milk, to have it well exposed to the atmosphere and thoroughly cooled down before it is left at rest for the night. When there are large quantities of milk to be attended to in hot weather, it will be better to spread it thinly over a considerable surface, rather than deeply, as in filling the vats. The temperature of the evening's milk should be so reduced that it will stand in the morn-

* Although in most cases the milk delivered at any one factory is made within one or two miles, yet it is often carried three miles, and in a few cases I found it carried five miles; the dairyman saying this was less trouble than to make it into cheese at home, and as the factory cheese brought two and a quarter cents more per pound than that made at home, while the charge for making it was only one cent, he saved a double gain by doing so.—[S. L. G.]

ing at about 62° or 63°, and it should be reduced to at least 62° before leaving it for the night. At the factories, where the carrying of the milk and the mingling it together from several dairies has doubtless a tendency to hasten its acidity, there is more necessity for care and attention than in families; or rather there is more danger of too much acidity.

It may be proper to observe, that the requisite degree of acidity in milk at the time of setting it with rennet, for cheese, is imperfectly understood by the generality of cheese makers, and must be learned by well and carefully conducted experiments. It is not possible to make so good a quality of cheese from milk recently drawn from the cow, or from any milk that has been kept too sweet, as from milk that has acquired proximate acidity. Neither will it be possible to obtain the greatest quantity of curd from the milk so manufactured. Such milk will require the addition of a small quantity of sour whey.

At the factories, it is believed, there is more danger from too much acidity than otherwise, since there are many causes to hasten that condition of the milk which are not present in family dairies. In the factories it is usual to cool the evening's milk to about 60°, by letting in water between the vats, by the use of ice, and by lifting and stirring the milk. This, under all circumstances, is or should be attended to. The lifting and stirring of the milk and exposing it to the atmosphere not only serves to cool it down to the desired temperature, but in another way operates favorably on the condition of the milk for the production of fine cheese, since the stirring and lifting process allows the animal odor to pass off more readily. If a considerable quantity of milk directly from the cow be placed in the vat and cooled down without proper exposure to the atmosphere, it retains more or less of this taint, and more especially if the cream soon rises to the surface, forming a barrier of escape, and holding it in the milk.

Some idea may be had of the effect of this animal odor by placing milk recently drawn in a vessel where it is closely confined and excluded from the air. In a few hours it becomes fetid and putrid. In family dairies too little attention is given to this point in the treatment of milk."

The process of manufacture at these establishments is substantially the same as that set forth in the report for 1862, pages 90–110. Some trifling deviations are made in consequence of difference in the condition of the milk and the larger quantity operated upon. Thus, as for obvious causes, before alluded to, the milk, when received at the factory, is nearer the point of sensible acidity than when put into the family vat at home; and also because five or six hundred gallons of milk in one vat will not lose its heat so rapidly as a small quantity, it is set, i. e., the rennet is added, at a lower temperature, say 82° or 83° instead of 88° or 90°, as in family manufacture.

At the factories the making of cheese is proceeded with more leisurely* than is usual in families. It is their work for all day, and no inducement exists to hurry through the process. The heat used in cooking the curd is raised *very* gradually, and is never allowed to exceed 98°. The curd is also handled with great care throughout the cooking process, which saves any loss of butter in it, while its long steeping in the whey is supposed to contribute to that peculiar, nutty, sweet flavor which is considered indispensable in a strictly first-rate cheese. This lack of hurry and its attendant evils might properly enough be classed with the advantages of factories over private dairies, since in the latter there is ever a very natural and almost irrepressible desire not to expend more time on the process than can be afforded, or conveniently spared from other pressing calls.

Whether or not it is best for the farmers of Maine to engage largely in dairying is for them to decide. I have endeavored, in the last report and in this, to lay before them, fairly and fully, such facts and suggestions as seem worthy of being weighed in arriving at a decision. If this be in the affirmative, the next question is whether it shall be mostly butter or cheese which shall be made. At present, prices are altogether in favor of cheese. If cheese is to be made a leading aim, the question next arises, whether it shall be by private or by associated dairies; and here the advantages of the latter are so great in the case of those commencing the business and unacquainted with its manufacture, as to admit of no hesitation; since by employing a few persons who are skilled in the art, and at a trifling expense, they may at once reach all the benefits and advantages enjoyed by old dairying districts, and which

* If there appears to be danger of the milk souring before the cooking can be *properly* finished, the process is hastened somewhat, but only as a choice of evils, because a too rapidly cooked curd is less objectionable than a sour one.

otherwise could not be easily, cheaply, or speedily attained. My own conviction is, that in many neighborhoods a change might be made, with comparative ease, from the stock at present kept upon farms, to dairy cows, sufficient to furnish an ample supply of milk within moderate distances, and that the introduction of associated dairies, in good grazing districts, would be attended with much larger returns for the vegetable food consumed by the stock than is now obtained.

FRUIT CULTURE.

" Forward in the name of God, graffe, set, plante and nourish up trees in every corner of your groundes; the labor is small, the cost is nothing, the commoditie is great; yourselves shall have plenty, the poore shall have somewhat in time of want, to relieve their necessitie, and God shall reward your good mindes and dilligence."

Thus wrote honest old Gerarde, more than two hundred and fifty years ago; and no better advice can be given to the farmers of Maine at the present time. There are few situations in the State,—probably not a single farm,—where fruit enough to add a healthful luxury to the farmer's store may not be readily grown, with a little painstaking; and there are very considerable districts so admirably adapted by nature to its production, that no other crop so well repays the labor and cost of culture. Apples, especially, may be grown with profit, to supply more largely the home market (it has never yet been properly supplied), *and for exportation also,* for our Northern grown fruits are among the best keeping and finest flavored in the world, and will command the highest price whereever apples can be carried; and with cargoes of ice they have been safely carried to the farthest points of the globe. The greater firmness of flesh which Maine grown apples possess, gives them a great superiority for shipment, over those grown in the Middle States. Apples sent from Portland to Cuba in slow sailing vessels, have arrived in much better condition than those sent from New York by steamers; and they can be sent after more southern grown fruit has gone out of market. It is true that our orchards have suffered serious injury within the past six or eight years, most unusual damage, so that some of them, in fact many of the older and more neglected ones, are unproductive and profitless; still facts abundantly sustain the assertion that, take twenty or forty years together, in suitable locations in Maine, no other branch of farm business has given, or promises to give in years to come, more ample returns than the judicious and skillful culture of fruit. If we may judge of the future by the past, there is little probability of as serious harm occurring again for one generation at least, as only one other instance of extensive damage is known to have occurred since the settlement of the State.

At the last session of the Board of Agriculture, I was instructed to make this a leading topic of the present report. Perhaps it may be thought by some that the publication of so many books on the same subject as have been issued during the past fifteen years, and which are accessible to such as seek information regarding it, should supersede the necessity of such a labor. If it were only general information which is wanted, this might be so, but such is not the case. We need the knowledge adapted to our own situation, and which they do not furnish. It is information regarding the *local* character of any fruit, which the orchardist especially requires, before he can decide whether to enter upon its extensive cultivation or not. By far the greater number of fruits are specially adapted to some locality, soil or climate, or to some combination of these. Nearly all develope their true worth only within a limited area, and sometimes within narrow limits; away from the soil or climate or other conditions which meet the peculiar wants of any one fruit, that fruit becomes inferior in quality, more or less unproductive, or otherwise profitless. Gerarde said truly in 1597: "Every clymat hath his own fruite, far different from that of other countries." Downing in 1845 wrote as follows:

"Those fruits which succeed perfectly in one section of the country, are sometimes ill adapted to another."

Jaques, in Worcester county, Mass., a little later, puts it strongly as follows: "If there are pears which ripen finely at Salem, but will not succeed in Boston; if the climates of Western New York and the shores of the Hudson differ so widely as to affect the quality of several varieties of different species of fruits, one might easily infer—what it has cost the writer something to learn—that whoever would succeed with fruit trees, in the hill country of the eastern States, may rely with tolerable safety upon the uncertain testimony of his own neighborhood, while the profoundest wisdom that has ever recorded the experience of other countries, would only mislead and bewilder."

Now it happens that the works on fruit culture by Downing, Thomas, Barry, Elliot, Manning, Cole and others, were all written for districts west and south of Maine, and most of them further from our southern limit than "Salem is from Boston," or "the shores of the Hudson from Western New York," and so may we not conclude, that to gather together, to collate, and to disseminate the results of experience *at home*, may be a needful and useful work?

Simply to prepare reliable lists of the best fruits adapted to the various sections of one State situated as ours is, so large as to embrace more than four degrees of latitude,* on the very border of orchard culture, too, and as many of longitude—great diversities of soil, surface and climate—might well occupy a life-time; and besides this, not only in the selection of varieties, but in *practice also, both in the nursery and orchard, different methods*, in some respects, *must be adopted*, if we would be successful, from those which prevail in other States.

It is therefore with much diffidence that the attempt is made; and were it not that twenty-five years experience in the culture and management of nursery and orchard trees, together with large opportunities for observation in this and in other States, may lessen the incompetency brought to the task, it would scarcely be undertaken at all.

Why Orchard Trees do not generally succeed so well as formerly.

It is a common and very just remark that orchards do not thrive now as they did when the country was newer. For this there must be adequate reasons, and it behooves us to ascertain, if we can, what they are, with a view of obviating them. In the first place, then, I would remark that the early plantations were set in a virgin soil, full of vegetable mould from the decay of forest trees and leaves for centuries, containing in abundance all the elements necessary to a thrifty growth. Thousands of trees have since then been set upon lands greatly exhausted by repeated croppings, with insuffi-

*The southern limit of Maine—say at Kittery and Elliot—is in latitude about 43° 5′; Saco and Alfred, about 43½°; Bridgton, New Gloucester, Wiscasset and Thomaston, about 44°; Dixfield, Waterville, Searsport and Ellsworth, about 44½°; Bingham, Exeter, Oldtown and Perry, above 45°; Patten, 46°; Houlton, a trifle further north; Presque Isle and Ashland, about 46° 40′; and the northern limit of the State about 47° 20′. Latitude alone, it is to be remarked, however, is not an exact guide to climate, as many other circumstances modify it not less—such as elevation, proximity to water, prevailing winds, &c., &c.

cient returns, and they have literally starved, not being able to obtain from it the food which they required, and consequently they languished and at length perished. This, it is evident, may be obviated by proper manuring, and for this purpose nothing is better than a compost of leaf mould with wood ashes and lime. If leaf mould cannot be had, muck from a hard wood growth, well decomposed by exposure to a winter's frost, and mixed with quicklime slaked with water in which common salt has been dissolved until it is saturated, is a good substitute. Muck from a wet swamp, composed largely of decayed mosses and leaves of evergreens, possesses considerably less value, but still is worth using, if no better can be had. It needs, however, a longer exposure, and larger additions of mineral matter. Stable manure may be mixed with the above compost to advantage, but, as a general rule, farm-yard manure is more needed for other crops than for fruit trees, and if used freely, it is liable to induce a late and unripened growth of wood. This is to be carefully avoided, for unless the shoots become fully mature, the tree cannot be relied upon, either for hardihood sufficient for our severe winters, nor for productiveness. These remarks concerning stable manure, it should be added, apply chiefly to nursery trees and to young orchards. When trees are in full bearing, and especially if the orchard is in grass, farm-yard manure may be applied to advantage.

Again, the earlier planted trees were generally *well sheltered* by the native forest growth. The value of shelter, in such a climate as ours, has never been sufficiently appreciated. In many localities this single circumstance alone may cause the difference between a stunted growth when exposed to all the blasts of winter and the blighting winds and gales of summer, and a vigorous healthful growth when properly secured against them. The success which has attended the planting of rows of evergreens, is really surprising to those who have not observed the results, or have not sufficiently reflected upon the subject; and warrants the belief that no more judicious investment can be made for young orchards in exposed situations, than the planting of evergreen screens, simultaneously with, or better still, previous to, the planting out of fruit trees. In some countries this subject is so well understood, that no success would be looked for with many varieties without such protection; and with it, there is no doubt that some kinds might be successfully grown with us, which now prove tender and unreliable without it.

Another reason may be found in the fact that new soils of naturally a rather tenacious character, but occupied to a considerable extent with roots, more or less decayed, do not suffer from the presence of stagnant water beneath the surface, to the same extent that the same lands will suffer from this cause after the roots of the former growth have completely decayed, and the soil has fallen into a more compact and less pervious condition than before. Here, too, the remedy is obviously indicated by the nature of the trouble, viz: THOROUGH DRAINAGE. Under-draining is absolutely necessary to success in fruit culture in all soils which retain water in a stagnant condition within two or three feet of the surface. Fruit trees cannot thrive with wet feet all the year round. To attempt their culture upon retentive soils without draining, is to throw away time and money. Every observing person knows that our best orchards are upon strong rocky or stony soils, *with a dry or porous subsoil,* which allows all surplus water to pass readily away. Rarely do orchards thrive even tolerably upon clayey or other naturally retentive soils, unless underlaid by a porous subsoil, or upon hillsides free from springs where the descent answers in part the purpose of drains.

Another reason of much force in this connection is, that the trees first planted *were seedlings,* which had grown four, five, or six years upon the farmer's own land, or in the immediate neighborhood, on similar soil, and there being plenty of them, only the best and most vigorous were planted out permanently. The simple fact that they had thus grown upon the spot is conclusive evidence that they were hardy, thrifty, and adapted to the soil and climate; and this not because, as many suppose and some have asserted, that a tree or plant by reason of having grown from a seed in any given locality, thereby acquires a character or constitution especially adapted to that locality, for this is false, the fact being that all the characteristics of a plant to be grown from a seed—as, for instance, whether its fruit shall be large or small, green or red, sweet or sour, as also whether the plant itself shall be vigorous or feeble, hardy or tender—*are all determined during the formation of the seed,* before it germinates at all, or anywhere, just as much as it is determined in the seed whether the plant to be grown from it shall produce an apple or a pear, a cucumber or a cabbage; but because, having grown vigorously for a series of years in a severe climate, the possession of hardihood and vigor are demonstrated by actual proof of the fact. Meantime all the tender ones which might have started in the same seed bed have perished, all the feeble ones have been rejected, and neither of them will give any future trouble. It is undoubtedly true that the efforts of nature *through the seed grown in a given locality* are towards such a variation as shall be best adapted to that locality, just as it is the case of Indian corn; only more plainly in the latter case because more rapidly; we can get several generations of corn from seed before an apple seed will produce its first fruit.*

Now what are the facts regarding the fruit trees planted in later years? While some have been grown as formerly, and grafted after being planted out, and some have been purchased of respectable nurserymen at home, thousands upon thousands have been planted which were grown hundreds of miles away, in a milder climate, often grafted with sorts, which, however well adapted to other localities, are tender or otherwise worthless in our soil and climate; and what is worse yet, frequently grafted upon bits of root, and so possessing little vitality compared with seedlings, but being stall fed by high manuring or a naturally rich soil, run up quickly into pretty trees to look at, and saleable only to those who know no better than to believe the plausible stories of irresponsible pedlars who hawk them over the country. Is it any wonder that a large proportion of such trees prove mere cumberers of the ground? The remedy in this case is too obvious to be dwelt upon.

To account for the fact that some varieties of fruit have apparently degenerated, certainly do not succeed so well now as formerly, Mr. Knight, a distinguished horticulturist of England, advanced a theory which was for a time quite popular, and is yet believed by some to be correct. His theory was that every seedling tree has a natural limit to its life, that within such limit there will be a period of vigor succeeded by inevitable decline, corresponding to the increasing feebleness of old age in an animal: also that every tree that has been propagated from it, whether by layering or by buds or grafts, is in fact merely an extension of the original seedling, and carries with it all its peculiarities and liabilities. The

* *Therefore* plant seeds of your best fruits, and if you cannot or do not wish to have all the seedling trees remain until fruiting in the natural way, take a scion from such as promise best, and graft it towards the end of a limb of an old tree. It will soon bear, and your fruit is thus tested at an early day.

period of vigor and of decline may be extended by influences favorable to the health of any particular tree, as it may also be shortened by unfavorable influences; but he holds that sooner or later, it must develope the decline and decay incident to old age, and finally become extinct.

Other eminent horticulturists, among whom are Lindley and Downing, dissent from the views of Mr. Knight, and believe that no such resemblance exists between the life of a tree and of an animal. They hold that a bud, equally with a seed, contains the germ of a new life; and that when a bud, or a cutting or layer having upon it several buds, strikes root into the earth, it becomes a new plant, as really as if grown from a seed. They believe that if a bud or a scion is engrafted upon a seedling stock and unites with it, striking its roots first into the stock instead of directly into the earth like a cutting, that such tree starts anew with all the vital energy of the parent plant. One of them* says: "With the exception of their integuments, a bud and a seed are the same thing. A seed is but a bud prepared for one set of circumstances, and a bud is a seed prepared for another set of circumstances—it is the same embryo in different garments. The seed has been called therefore a 'primary bud,' the difference being one of *condition* and not of *nature*. It is manifest then that the plant which springs from a bud is as really a new plant as that which springs from a seed; and it is equally true that a seed may convey the weakness and diseases of its parent with as much facility as a bud or a graft does. If the feebleness of a tree is general, its functions languid, its secretions thin, then a bud or graft will be feeble—and so would be its seed; or if a tree be tainted with disease, the buds would not escape, nor the trees springing from them. * * The conditions in which a bud grows render it liable to extrinsic ills not incidental to a plant springing from seed. A seed emitting its roots directly into the earth is liable only to its own ills; a bud or a graft emitting roots through the alburnum of the stock on which it is established, into the earth, is subject to the infirmities of the stock as well as its own. Thus, a healthy seed produces a healthy plant. A healthy bud may produce a feeble plant because inoculated upon a diseased branch or stem."

Accordingly, the advocates of the latter theory account for the

* Rev. H. W. Beecher, in Horticulturist, Oct., 1846.

deterioration of certain varieties by supposing them to be more or less *diseased*;—that they are troubled with something analogous to what physicians call "tubercular diathesis," or a scrofulous condition in man. Such a habit is hereditary in man, and we find the progeny of some degenerate kinds of fruit, whether they come of seed or by grafting, to inherit the diseased habit of the parent. Such a condition might arise originally from various unfavorable influences, or, more likely, from a combination of them;—as, for instance, from insufficient food, or from too stimulating food, inducing a succulent and unripened growth of wood; from too severe a climate, or from continued propagation upon unhealthy or unsuitable stocks. They belive, moreover, that as the scrofulous habit, unless very virulent, may be overcome by a judicious course of treatment, so this deterioration of certain varieties of fruit is not incurable, like old age, but that restoration to full health and vigor is possible.

The practical deductions from these differing theories are not nearly so much unlike, as the theories themselves. Both alike teach the importance of endeavoring to sustain and extend healthy existence—to plant in fitting soils and situations, to supply appropriate food in sufficient quantity, shelter to the trunk from the scorching rays of the sun,* and to the leaves from blighting winds—protection, so far as practicable, from the attacks of enemies like insects, vermin and parasites; to eschew all needless mutilations under color of pruning; in a word, to bestow such judicious care and treatment as shall result, so far as the result is under our control, in continued vigor and productiveness.

Is Fruit Culture Profitable?

The remark was made just now, that notwithstanding the very unusual and severe drawbacks to the growth of fruit, which were experienced a few years past, and which probably may not be repeated in the lifetime of the present generation, it has been and promises to be in the future, as profitable a branch of farming as any which can be pursued among us. The neglected appearance of the older orchards, generally, throughout the State, would suggest that such is not the common faith, but rather that the growth of fruit is best attended to by *letting it grow*, and doing nothing

* Best done by low branches.

either to help or hinder it; or that little or no thought is given to the subject.

I have my own opinion on the subject and have stated it above. It seems proper to add the testimony of others, from various parts of the State. To obtain this, a circular was sent out last summer to several hundreds of orchardists, in which, among other inquiries, was the following: "What would you estimate to be the comparative returns from an acre of apple trees, say one hundred, *well cared for*, during a period of twenty or thirty years, and from an acre of similar soil devoted to other crops, and receiving the same amount of care, labor, and manure, during the same period?"

I have reason to believe that most of the replies came from men whose experience and observation are such as to enable them to speak advisedly on the subject. It is evident that the question was variously understood, and this fact may account, in part, for the diversity of the replies.

Below are some of them, from different sections, the least favorable and the more favorable,—as nearly as possible a fair sample of the whole,—and first I will quote from a communication from a gentleman living in latitude between 45° and 46°, not far from forty miles from Bangor, and where I have seen evidences of as severe injury from the hard winter of 1856–7, as I have in any part of the State. "Before 1847 my chief study of apples was how best and most expeditiously to gather and dispose of a thousand bushels, more or less, each fall, and how fastest to work a big cider mill. Since then I have set, with my own hands, more than a hundred thousand scions, in various orchards in this county. I ought to have learned more in regard to apples in northern Maine than I really know. I have passed through several towns of this county during the past season, and I have not seen an orchard of any age that is cultivated and cared for as indicated in the tenth question of your circular of July last. Consequently that question cannot be answered where no data exist for its solution. The little orchard where I now reside, was first set ten years since. Many of the trees failed by the effects of the hard winters. All vacancies were filled as they occurred, and all the trees had a circle of four feet well hoed around them and an occasional application of some fertilizer. The last two seasons the whole ground has been plowed and planted, and the improved condition of the trees shows that the former treatment was very far below what is meant in the expression, 'well cared for.' * * * *

"The raising of apples may be made a source of large profit on the majority of farms in this county, both for home consumption and for market, and many farmers are now realizing extensively from this source. I am satisfied that no crop of the farm is more deserving of, or will better pay for good care."

Another in the same county says, "I cannot state definitely, but the orchard would be more than double the profit of any other crop."

I know of no better section of the State for orchards than Oxford county, but one reply received from that county gives by far the lowest estimate received from any source, viz: "With fair success, an orchard may be as profitable in thirty years from planting as the same amount of culture of other crops. I should be unwilling to set it higher, though no doubt there are many instances of much greater profit from an orchard." This reply probably refers to the income yielded by orchards on an average, and as they are, rather than to what would be were they *"well cared for."*

Another in the same county says, "I have fifty trees in a pasture which have yielded me a hundred dollars a year on an average of the last ten years." I do not know how much room these trees occupy, or how much expense is bestowed upon them—but if not more than an acre, and the amount is the net profit, that acre is as good, while it holds out, as sixteen hundred dollars at interest; and it is probably taxed for a good deal less than that sum.

From a very intelligent orchardist in Lincoln county we have as follows: "One acre of orcharding on suitable soil, with proper care and attention, will produce three times the amount in value of any other crop we usually cultivate on our farms with the same amount of labor and manure."

From Waldo county we have the opinion "that an acre of apple trees, in good bearing condition, on the right kind of soil and location, will yield an average annual net profit of fifty dollars during a term of twenty years; and that the net profit per acre of corn or potatoes will not exceed twenty-five dollars per year for the same period."

From Penobscot county comes the reply: "Decidedly in favor of fruit."

An enthusiastic cultivator in Kennebec sends the following:

"An estimate of the comparative returns from an acre of apples and an acre of other crops must be mere guess work, for I have no accurate data upon which to speak with certainty. If high, rocky side hills, such as are usually devoted to pasture, and often furnish the best location for an enduring and productive orchard, are selected, the returns from an acre in good bearing condition would equal that from thirty acres in pasture. If good tillage land is taken and kept in tillage, with a trifling addition of manure for the trees, there would be but little diminution of the tilled crops during ten years. It could not be expected that during the first seven years on the tilled land and ten years on the pasture, the returns would more than pay the cost of trees, planting and subsequent care. For the following twenty or thirty years, I estimate the net returns from an acre of orchard equal to that from ten in tillage or thirty in pasture."

Another, not many miles distant from the last, says: "Devote an acre of land to apple trees, say one hundred, and for ten or fifteen years other crops could be cultivated on the same ground without much hindrance from the trees, and for a period of twenty or thirty years my opinion, is that 'other crops' taken from the land, if as 'well cared for' as an orchard should be, will more than pay for all extra manuring and trouble, so that, according to this reasoning, I believe it safe to reckon the additional value of an acre of apple trees to be the value of the fruit, deducting the cost of gathering and marketing. I should estimate the income for that period of time to be from three to five times more than from other ordinary farm crops."

One in Cumberland county, living near their best market (Portland), says: "To compare the product of an acre of apple trees with the same amount of land in other crops, and receiving the same labor, manure and care, will depend more upon the character of the soil than locality in the State. Land that is well adapted to corn will usually grow good apple orchards; but it is a waste of labor and money to try to grow trees on land not suitably drained, or on land naturally unfitted for trees. Five or six hundred dollars is not more than a fair value for a well grown young orchard covering an acre of land. No other crop generally grown could remunerate the owner of land purchased at one-half, or perhaps one-quarter of those prices. Market gardening, in advantageous positions, would perhaps prove profitable at so large an outlay for land, but this is because the labor of cartage of vegetables and manure to and from the city is made less by more than the interest on the price of the land."

Another in the same county, but living some forty miles from the city, says: "Your tenth question can only be answered *correctly* by reference to a diary of facts kept through a series of years. I answer, *generally*, I believe in this locality, the same amount of care, labor and manure applied to an orchard will produce double the profit they would if applied to any other crop usually cultivated. Orchards here are sadly neglected, my own among the number. Better care would pay well."

A cultivator in Sagadahoc county says: "I am unable to state the difference in dollars and cents, but I am sure the comparison would show a large percentage in favor of fruit." And another in the same county says: "I cannot answer the question with precision, but I am fully persuaded that my orchard for the last twenty years has yielded me much larger profits than the same ground would if devoted to any other crop with the same outlay for the same period."

The only reply from Androscoggin county is, "That the comparison would be four fold in favor of apples."

A farmer in York county, of considerable experience with fruit, and living twenty miles or so from a seaboard market, makes the following estimates: "In answering your tenth inquiry, much depends on the situation and nearness of market, and the natural fertility of the land for orcharding. The best orchard lands lie back from the sea, lakes or rivers; consequently away from markets, and the best grass land is not the best orchard land, and good orchard land is good for corn or other grain; and hay or grain is worth nearly as much twenty miles back from the seashore as it brings in the seaport markets; but apples at that distance bring much less than in good markets. Then there are other considerations. The apple crop of a good orchardist does not sap his farm if taken off and sold, like hay or grain. Now, to be fair about the matter, I will calculate for the orchard land in this town. One acre properly prepared for trees is worth one hundred dollars. One hundred trees, five years from planting, the land to be cropped to pay the expenses during that time, including manures and interest, one hundred dollars. The yearly expenses subsequently as follows:

Three cords of compost, at $5,	$15 00
Cultivating it in with horse,	2 00
Care and attention,	25 00
Decay—to set new or keep good,	25 00
Taxes and interest,	18 00
	$85 00

This estimate is for *good* culture.*

Five bushels per tree is a fair average crop, taking twenty or thirty years together, and twenty-five cents per bushel a fair average price for them in the orchard—

Making the annual income,	$125 00
Deduct annual expense,	85 00
Leaves a net profit for each year of	$40 00

Good apples often bring much more than I have set these at, and what is gained by marketing I am willing to call profit in trade and lay it out for manure, or grain to make manure, to go on grass lands.

An acre of grass land in good culture I also call worth one hundred dollars—the annual expenses I reckon as follows: Three cords of manure once in three years is equal to—

One cord, (for one year),	$5 00
Harvesting the hay,	5 00
Taxes, $1; interest, $6,	7 00
Annual expense,	$17 00
Crop, two tons of hay at $10 per ton in the barn,	$20 00
After-math,	3 00
Making,	$23 00
Deduct expenses as above,	17 00
Net profit,	$6 00

If these figures are correct, there would be thirty-four dollars yearly in favor of the acre of orchard over the acre of grass, or six hundred and eighty dollars in twenty years."

* How many orchards in this State receive fifty dollars' worth of care and attention *annually* including what replanting is needed, or half of it?

I have often seen statements of great productiveness and profit attending fruit culture—of fifty, sixty or more bushels of apples on a tree in one season—of as many dollars received from the crop of a pear tree—of a thousand dollars from an acre of pears in a year; and there is good reason to believe many of these statements to be strictly true; but I would never quote them as having any bearing on the profits of simply good orchard culture—such culture as I would recommend to the farmers of Maine, and such as they can bestow, if they will, to a very considerable extent; and for the simple reason that such cases are exceptional ones, being sometimes the result of a fortunate combination of accidents, and, at other times, of a high degree of skill and a lavish expenditure of labor and manure in preparation, connected with the most favorable natural conditions.

But such statements as are quoted above, based, as they are, on the observation and experience of plain, sensible farmers among us, not given to exaggeration, and who, by their own testimony, have rarely bestowed, or seen bestowed by others, as good culture and attention as yields the most profit, may be relied on as fully sustaining the proposition which I maintain, viz: That no other crop, nor any other branch of rural industry, promises more satisfactory returns in Maine than fruit culture, if judiciously pursued. It is believed to be safely inside the fact to say that good orchards, at, or nearly approaching maturity, on suitable soils, treated as well as other crops are treated, will pay an average annual net profit of fifty dollars per acre; say the interest of eight hundred dollars. Why then cultivate whole farms with hard labor for a net proceed of how much? I do not know how much your farm pays of *net profit* per acre. Is it five dollars? ten dollars? twenty dollars? Reckon and decide as you find sufficient cause. Neglected orchards don't pay much. Why should they? Would corn or potatoes pay better with such neglect?

Before entering on the more practical portion of our subject it may be well to devote some thought to the physiolgical principles involved in it, in order the better to understand the why and the wherefore of suitable practice.

General Principles of Horticulture as connected with Fruit Trees and their Culture.

A tree is a living, organized body made up of various parts or organs. The root, the stem, and the leaf, comprising those which it needs for growth, are called the organs of Vegetation. The flowers, together with the seed which comes from them, are called the organs of Reproduction. These take no part in the nourishment or growth of the tree, but on the contrary are exhausting in their effects upon it. Their special office in the operations of nature is to reproduce and perpetuate the species. Incidentally, in the case of the trees we are about to consider, to yield, for the use of man, a supply of fruit, wholesome, nourishing and delicious.

The *root* grows downward into the ground, usually branching again and again, until terminating in fibres or rootlets, the extremities of which are known as spongioles, from their delicate, spongy texture. The office of the root is to absorb nourishment for the support of the tree. This it does by means of the spongioles, the sponge-like extremities. What is known as the *collar*, is the point of junction between the root and the stem. The *stem* is that part which starts from the collar and grows upwards.* There is usually a correspondence between the growth of the roots and the stem—for instance, if the main roots grow directly downward, the stem will tend directly upward. If they are mainly on one side, the tree will grow more to that side. The original or main root of a seedling pear or apple usually penetrates the earth in a vertical direction. If this root be cut or otherwise disturbed, it will at once send out lateral branches, and the tendency upon the tree will be to form a more spreading top. If a tree is designed to furnish an upright trunk for timber, it would be bad policy in any way to disturb the tap root. If, on the contrary, the tree be designed for the production of fruit, it is well to encourage the formation of lateral or horizontal roots, as this tends to the production of a well developed and spreading top. Besides this correspondence in the style of growth, there is much of intimate relation and mutual dependence between the stem and the root. As the roots collect and furnish food to the stem and leaves, so these, in their time, transmit nourishment to the roots, by virtue of which they

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* The branches are, as it were, repetitions of the stem, and for present purposes may be considered part of it.

extend and strengthen, each depending upon the other for sustenance, and even for existence. There is reason to believe that every root so formed has its corresponding part above, and that every extension of the stem has its corresponding roots, and that whatever affects one of these affects the other. Were this truth realized by orchardists, we should see less misuse of the knife and saw in mangling trees under color of pruning; and we should see a wholly different plan followed in the grafting of grown trees from that so often adopted, of at once removing the whole top. We shall have occasion to refer again to this in treating of pruning and grafting.

A stem possesses the property of forming along its surface, divers minute vital points, of the same nature as the one in which the stem itself originated. These become *leaf-buds*, each one capable of becoming a stem or a branch like the one upon which it was formed, and capable also of becoming, under favorable circumstances, an independent plant or tree. Each of these buds is usually nourished by a leaf which springs from the bark just below the bud, the latter growing in the axil thus formed.

It is by means of these leaf-buds that propagation by budding, by grafting, by cuttings or by layers, is effected. When a bud, or a scion with several buds on it, is inserted into another plant, under favorable conditions, they produce wood which unites with that to which it is joined. A cutting or a layer placed in the soil, emits roots into the soil. In either case we have a new plant, possessing leaves precisely similar to those of the parent stock. Sometimes, and oftener with some species than with others, these vital points or buds are formed and developed along the root and shoot upward from it. These are known in the nursery as root suckers, and are sometimes resorted to for propagation of fruit trees, especially the plum and pear, but they make trees much inferior to seedlings, and should never be used where seedlings can be obtained.

The leaf buds of fruit trees rarely push into growth during the season in which they are formed. The succeeding year a part of them grow into branches, but not all. As the original embryo remains for a time latent in the seed, so leaf-buds may remain dormant for an indefinite length of time without losing their vitality. The terminal bud and those near the end of the shoot, if the wood be fully ripe, and has not been injured by the winter, are most readily excited into growth, and those nearest its base are the most sluggish. Leaf-buds sometimes remain dormant for years; they may even be covered up by succeeding growths of wood, and yet by severe pruning may be forced into growth and develope into branches.

The *leaves* constitute the foliage of the tree. A leaf is an appendage to the stem, and has a leaf-bud in its axil. It consists of an expansion of the cellular rind of the bark, through which are distributed veins, or tough woody fibres, like ribs, and over all is an epidermis or skin. Through this skin respiration, perspiration and absorption take place. The office of the leaf is analogous to that of the stomach and lungs in animal life. The tree does not get its food wholly from the root. A portion of it is obtained by the leaves from the air. This, with what comes from the root, through the stem, dissolved in sap, is here exposed over a large surface to the action of sunlight, air and other external agencies, by which, in connection with vital action, the crude materials are elaborated and digested, and returned to the general circulation to be assimilated, and go to form root, wood, leaf, seed and fruit.

If it were proper to say that one organ is more necessary than another, when all are indispensable, we might give this distinction to the leaf, but this we may certainly affirm, that the *functions of the leaf are essential to the healthy existence of the plant*, and that whatever disturbs their free and normal action diminishes its health. Some persons, ignorant of this, have been so foolish as to strip a grape vine of its leaves, with an expectation of hastening the maturity of the fruit by the admission of more light and air. The fact is, that sunlight and air influence the ripening of the fruit indirectly, and by their action upon the plant through its leaves. By ill management the leaves on a vine may and often do become so numerous and crowded as to prevent a proper discharge of their functions. In such case the early removal of a part, by allowing the more perfect development of a suitable amount of foliage, will be found beneficial.

In spring the opening of the leaf-buds is accompanied by the extension and increased action of the spongioles of the root, and the action of the leaves upon the roots and of the roots upon the leaves, throughout the whole season, is constant and mutual. Cut off all the spongioles from a tree in full growth, and the foliage at once withers and dies. Let the leaves be destroyed by a blight or removed by design, and growth is at once suspended, the action of the root is suspended, and the maturing of its fruit is suspended. Without the full and healthy action of the leaves, a tree cannot possibly mature either its wood or its fruit. The peculiar characteristics of any fruit, as its size, flavor, texture, keeping qualities, &c., are doubtless due to some peculiarities of the leaf which determine the nature of the nutriment supplied to the fruit, and which is elaborated or manufactured, as it were, in the leaf. These peculiarities of the leaves in different varieties of the same species are so obscure that no one from an examination of a leaf could determine the properties of the fruit to be produced by it; but the fact appears to be certain, for if we would reproduce any given varieties, we can do so only by means of leaf-buds. By inserting into another tree, a single bud, or a scion bearing several buds, we can determine the future foliage, and so be sure of perpetuating the desired variety of fruit.

For aught which appears thus far in considering the *Organs of Vegetation*, it would seem that a tree might go on to grow and extend itself upwards and outwards and downwards indefinitely, and stop growing only when a supply of nourishment should fail. But such is not the case. After a period of growth, varying with different species and varieties, and somewhat also with the conditions under which they are grown, they arrive at puberty, and now a new series of organs appear and come into action, viz: the *Organs of Reproduction*, or those by which it multiplies or increases in number. In the case of the trees we are considering these consist of the flower and the fruit containing seeds.

Flowers come from buds just as branches do, but in this case, instead of elongating into branches, the leaf-buds first undergo a transformation into flower-buds. In the peach and the quince this change takes place towards the end of the first season, and the fruit is borne on wood of the preceding year's growth. In the apple, pear and plum it takes place commonly the second or third year, and it is usually the smaller and less fully developed buds near the base of the previous year's shoot which are thus changed in their form and nature, while the more vigorous ones push into branches. What causes this transformation of leaf-buds into flower-buds is not known; but we may learn something of the circumstances usually attending it, and of the results flowing from it; as, for instance, that seedling trees usually are slower in coming to productiveness than grafted ones; such as are situated in moist, rich soils, thus favoring rapid growth, are more tardy in bearing than the same kinds would be if growing in a soil less favorable to rapid growth. If one species be grafted upon another which furnishes a more abundant supply of sap, as when the plum is worked on the peach stock, growth is more rapid, and bearing is retarded. The reverse of this is also true; when one species is worked on another of slower growth, as the pear upon the quince, productiveness is hastened. The wood-producing and the fruit-producing forces are, as it were, antagonistic to each other, and, as a general rule, whatever favors the one tends to lessen the other. Whatever produces excessive vigor is favorable to the formation of leaf-buds; while, on the other hand, whatever tends to diminish luxuriance, without injuring the health of the plant, favors the production of flower-buds instead of leaf-buds. An apparent exception to this rule is found in the fact that a scion from a young seedling tree may be made, by grafting it upon a mature healthy stock, to produce fruit at an earlier age than it would otherwise have done, but this is doubtless owing to the presence in the mature stock of a sufficient quantity of secreted matter fit for the development and maintenance of the flowers when produced. The bending downward of limbs, or training by any mode which checks the free circulation of the sap, induces fruitfulness. So does transplanting or root pruning, because, the roots being injured, sap is less abundantly supplied in the following season to the leaves, and thus being less able to grow, they do not consume the nutritious matter lying in the branches and which they would have expended had they grown with their previous vigor; consequently the nutritious matter accumulates and fruit buds are formed.

If the blossom buds of one year are all removed or destroyed, the crop the next year is more abundant; and a very abundant crop of one year is usually followed by barrenness the succeeding year. Many kinds of apples have a tendency to bear only in alternate years. This is owing to the exhaustion which follows the production of more fruit than the tree is able to produce continuously, so requiring a season of rest in which to recruit its energies. This may be easily remedied, or the bearing year changed, while the trees are young, by removing the bloom buds or the young fruit as soon as formed. In repeated instances the bearing year has been changed by this method from the "even" to the "odd" year, with great increase of profit to the orchardist.

Blossom buds draw heavily upon the tree for nourishment, and they return nothing to it; therefore flowering as well as fruiting is an exhaustive operation. I have noticed with some pears, as the Duchess d'Angoulene for example, that an abundant bloom in spring ushered in a barren season; while a very moderate bloom has frequently been followed by a plentiful crop.

There is often, and especially with those just commencing the culture of fruit, a strong desire for early and plentiful bearing, but such persons should remember that unless their trees first attain a suitable degree of strength and maturity, and have, as it were, laid up sufficient capital to honor the drafts made by flowering and fruiting, feebleness, premature old age and decrepitude will be the sure result. The removal or thinning out of fruit on young trees is often one of the most judicious and best paying operations of the fruit garden or orchard. It would not be practicable to do this to advantage on a large scale, with trees arrived at maturity, but while the orchard is young a regular habit of bearing in some, and a change in others to the years of usual scanty bearing is easily accomplished.

Flowers consist of floral envelopes, the *calyx* and *corolla*; and of sexual organs, the *stamens* and *pistils*. The *calyx* is the outer covering or lower envelope, usually green, and resembling ordinary leaves. The *corolla* is the inner envelope, of brighter colors and more delicate texture, and form the most showy part of the blossom. The several parts of the *corolla* are called petals.

The sexual organs are of two kinds; the outer ones called *stamens*, being the male organs; and the inner ones called *pistils*, which are the female organs. A stamen consists of a slender column or stalk, called a *filament*, which bears on its top a rounded body or case termed the *anther*, filled with a powdery substance which it discharges and drops upon the pistil. The pistil consists of the *ovary*, the hollow portion at the base, which contains the ovules or bodies destined to become seeds; the *style*, or erect portion, and the *stigma*, a small glandulous body on its summit, and which receives the pollen or fertilizing powder from the anthers.

Plants are called *hermaphrodite* when both stamens and pistils exist in the same flower. This is the case with most of our cultivated fruits. They are called *Monœcious* when the male and female flower are separately borne on the same tree, which is the case with the filbert. They are called *Diœcious* when the male flowers are found on one plant and the female on another, which is the case with some varieties of the strawberry, but not with all.

Impregnation is effected by the action of the pollen or fertilizing granules, which, when the flowers first open, is covered by a delicate membrane about the anther. This membrane soon bursts open and scatters the pollen, a portion of which falls on the stigma of the pistil and penetrates through the style to the ovary. Here impregnation is effected and a new embryo plant soon commences formation. Sometimes, where the ovary is composed of several cells, as in the apple and pear, impregnation is only partially effected, and hence the development of the fruit is only partial and one-sided.

Hybridization is performed by fertilizing the pistil of one species or variety with pollen from the stamens of another. Many precautions are necessary to insure success, the principal of which are first to remove the stamens from the plant intended for the mother before they shed any pollen upon the pistil; and next, after the proper application of pollen from the destined male parent and at just the right time, to guard the flower from accidental impregnation from other varieties.

As soon as the ovary is impregnated and begins to swell, the petals, stamens and other parts of the flower, no longer required, fall off, and the fruit *sets*, as we say. It now continues to receive food, and gradually arrives at maturity.

Propagation and Nursery Treatment.

First by seeds. Fruit trees are grown from seeds mainly for the purpose of obtaining stocks upon which to bud or engraft the choice varieties; sometimes for the purpose of obtaining new varieties. The seeds of the apple, the pear, &c., will always produce their own *species*, but not the same *varieties*; that is to say, apple seeds will always grow into apple trees, and never into pears, and pear seeds will produce pear trees and not apples; but the seeds of a Rhode Island Greening or of a Roxbury Russet may not be relied upon to produce a greening or a russet. It is by means of variations, primarily induced by the conditions attending culture, that we now have delicious varieties of fruit from the original crab apple and wild choke pear; and there exists in all cultivated fruits a tendency to variation by means of their seeds, and this variation is partly in the direction of a return to the wild type, and partly towards a more ameliorated one, so that occasionally we obtain a better fruit than the parent, and it is from these instances that we have our best varieties.

When it is desired to obtain new varieties two methods may be employed. First, by selecting and sowing the seeds from the best grown specimens of the finest sorts, to be planted out for fruiting; selecting for this purpose such as exhibit in their foliage and general appearance the greatest remove from the wild type. This appearance may not be more readily described than the countenance or handwriting of an individual, but is easily recognized by a practised eye, just as a good nurseryman or orchardist can distinguish many known varieties by their peculiarity of appearance in habit, wood or leaf, and name each of them accurately without either label or fruit upon them. Such as bear fruit unworthy of cultivation may be grafted. It is well, however, if the first fruit be only tolerably good, to allow the tree to bear several years before grafting, because the fruit of seedling trees often greatly improves as the trees approach maturity. The other method is by artificial hybridization. This is performed by fertilizing the pistil of one species or variety with pollen from the stamens of another. The seed so impregnated will produce a cross or hybrid between the two parents. This process is now well understood by horticulturists, and has been extensively practised by florists for the production of flowers:—our finest Roses, Dahlias, Camelias, Fuchsias, and many other flowers, have been originated in this way. Some fine fruits also have been produced by this method, and a great deal more undoubtedly might be done by thus combining the size, productiveness and hardihood of one variety, with the delicacy of flavor and texture of another. Hybridizing is a delicate operation, and requires care and many precautions to ensure success. Of the fruits directly obtained by cross breeding may be named Coe's Golden Drop plum, which combines in a considerable degree the flavor of the Green Gage with the size and vigor of the Magnum Bonum, its other parent. The Elton cherry was the result of a cross between the Bizarreau and the White Heart. By far the greater number of our cultivated fruits have, however, been accidentally cross bred:—that is, the product of seeds from good fruit where the pollen was conveyed to the pistil by the wind or by bees or some such mode.

It is the practice in nearly all the fruit-growing sections of this country and in other countries, to plant out seedlings one or two years old, into nursery rows, and to bud or graft them near the ground, within the next year or two;* then after one, two or three years' growth of the bud or scion, to remove them permanently to the orchard. This may be done here to advantage with such sorts as are sufficiently hardy, and vigorous growers; but there are many desirable varieties which do not generally succeed by this method; and for such it is found greatly preferable to allow the seedling stock to attain sufficient age and size to be grafted in the limbs, after being established in the orchard. This involves considerably more labor, but without it, success cannot be looked for with any good degree of confidence. The attempt will be made, when treating of varieties, to mention those, so far as our knowledge extends, which it is necessary to graft in the limbs. For this, and for many reasons I would recommend the Maine orchardist, as a general rule, to have a nursery and grow his own trees. Every orchardist ought to be acquainted with the work needful in the nursery. Scarcely any farm work is more easily learned, none is more pleasant Sons and daughters should become familiar with it, and work in it, for, to say nothing of the gratification and profit to be derived thereby, nothing binds children to the home of their childhood more than fine fruit trees of their own care and planting. An hour or two of attention given at suitable times will keep a nursery, of sufficient size for any one family, in good order.

For this purpose, let seeds from the *hardiest* and *thriftiest* trees in the neighborhood be thinly sown in autumn, in good soil, in beds, covering the seed about one inch deep. When they grow, keep them free from weeds and see that they do not crowd each other. At the end of one or two years let them be lifted, in the spring;—select the healthiest and hardiest, and only these, be they few or many, throw the others away and plant the best in nursery rows, four feet apart. A part of the trees may be set eighteen inches apart in the rows. This is for such as are destined to be budded or grafted before removal to the orchard. The rest may be set at three feet apart, and remain until of proper size to plant out finally. The place selected for the nursery should be sheltered

* The only notable exception to this rule is in the case of apple trees propagated by *rootgrafting*, as extensively practiced in Western New York,—a method which results in trees worse than worthless for our climate—and which will be again noticed before we leave the subject.

from high winds, well fenced, and in a way not to favor the drifting of snows upon the young trees. The soil may be similar to that of the place designed for the orchard, and should be deeply worked for two years previously. If not good enough to yield fifty bushels of corn per acre with ordinary manuring, it should have a liberal dressing of compost made of leaf mould, i. e., decayed leaves from the woods, mixed with wood ashes and lime. Fruit trees, if stunted or ill fed in their earlier years, can never become what they ought to be;—on the other hand, stimulating manures are to be avoided as liable to induce a late and unripened growth of wood which cannot withstand our severe winters. If the seedlings grow well, those to be worked in the nursery may be budded in August, or grafted in the spring following; at which time the budded ones are to be headed down to within three or four inches of the bud. After the buds start, and as often as necessary during the season, rub off the robbers—that is to say, all shoots except from the inserted bud or scion; and tie the bud to the stock above in such a way as to secure it from being blown out. As it is of prime importance to secure well ripened wood, and more especially the first year, it is well to go through the trees from the 5th to 15th of August and pinch the ends of such as are still growing, so that instead of extending in height, they may devote the remainder of the season to hardening and ripening the wood already made. Clean culture and thorough loosening of the soil are to be continued as long as the trees remain in the nursery. Those which are not worked require no treatment beyond a little pruning to shape them properly. All the trees not removed to the orchard at a year from the bud should have their tops formed before removal, and if properly done, little subsequent pruning will be found necessary.

Whether grafted young or not, the evident design of nature to shield the stem from the burning rays of the sun, by means of side branches or shoots, should not be interfered with so as needlessly to expose the trunk to its scorching influence. This is a point of considerable importance, but is often thoughtlessly sacrificed to the supposed beauty of a bare, smooth stem; many young orchards have been seriously injured in this way. The lower side shoots and limbs should be *gradually* removed, and only as the tops extend sufficiently. Low branching tops are preferable to high ones, as more healthy and productive. An excuse, often given for desiring tall stems, is, to allow cattle to graze in the orchard. The excuse has no validity whatever. The place for cattle is in the pasture, and the orchard should be as much devoted to fruit as the wheat field to bread. If the grower insist upon tall stems, so that grazing or plowing be practicable, let them be formed by degrees and very gradually.

A principal reason for the recommendation that the orchardist should have a nursery of his own, is the difficulty of procuring good and reliable trees in any other way. If brought from other States they must necessarily be more or less unacclimated, besides which there is the delay, expense, and damage from exposure to various injuries attending transportation. Nurseries are neither numerous nor extensive within the State, and scarcely any apple nurseries are known to have been profitable enough to their owners to secure their long continuance, unless by the sale of trees grown elsewhere. Purchasers have been unwilling, generally, to pay a price at all corresponding to the greater cost of growing them here; including in the cost of growing, of course, the unavoidable losses from the severity of some winters, the breaking down by heavy snows, and various other contingencies; and, consequently, nearly all attempts to establish nurseries have proved failures. But to an extent sufficient to furnish one's own orchard and make gradual additions to it, the labor and expense are inconsiderable compared with the superiority of the trees thus grown, and well worth being incurred. As an acre, in rows four feet apart with half the trees at eighteen inches in the row, and the rest at three feet apart, will contain between four and five thousand trees, probably not more than an eighth to a quarter of an acre would be needed to supply any ordinary plantation; and the time required need not interfere seriously with other farm labors.

Although the matter has been already incidentally alluded to, I feel that I should be blameworthy should nothing more be said to warn the orchardists of Maine from planting Western-grown *root-grafted trees*; such as are so assiduously hawked about the State by ignorant and irresponsible tree venders. These trees are grown in the neighborhood of Rochester, N. Y., and in other places, by millions. I have myself seen hundreds and perhaps thousands of acres thickly covered with them, and they are so cheaply grown as to be sold at from four to seven dollars per hundred. Having little root, they are easily transported, and can be retailed here at from one to two hundred per cent advance, and yet at a less price than the bare cost of growing trees in a proper manner in Maine. Now a tree *can* be "rootgrafted" in such a way that it shall be as good as a tree grown by budding on a seedling stock in the nursery, but this would involve the use of an entire seedling root by grafting it at the collar, which would be nothing more or less than stock grafting at the surface of the ground, and would involve as much or more labor than the ordinary method. But these Western trees are made by working a scion on a bit of root sufficient to keep it alive until it throws out roots of its own. The work is done in winter, when there is nothing else to do, and they are dibbled out in spring, and no farther labor is given, except horse hoeing between the rows, until they are sold. When grown they are simply *rooted cuttings*.* Thickly planted in rich soil, they soon run up into pretty trees to outward appearance, but when lifted are found to be furnished with only a little tuft of fibrous roots, unable to support the tree properly when transplanted, and worse still, they are destitute of the energy and *vitality* of trees grafted upon entire seedling stocks. Probably nineteen-twentieths of the apple trees brought into the State for the last ten years, are of this sort, and although in some cases they live several years, yet I have never seen an instance of what might be deemed fair success; and it is undoubtedly true that not one in a hundred has lived to come into bearing. The most successful instances are those where they die outright at once, and involve no further trouble and disappointment; but sometimes they live and linger for years, until the orchardist is fain to dig them out and be rid of the sight of them. Too often, being ignorant of the real trouble, he is discouraged, and concludes that all attempts at fruit culture are useless. Concerning the value of such trees for planting upon Illinois prairies, or in mild latitudes in other States, I have only to say that different opinions are expressed by those who have had experience with them. While many Western nurserymen claim that they are good enough, many others deny it, and point to thousands of cases of failure. At a meeting of the Western Fruit Growers' Convention,

* I have never grown the apple from cuttings, but have been informed by intelligent orchardists in the State that it has been repeatedly done, and that with care and good treatment they will attain a fair size and sometimes come into bearing; but that they are never firmly rooted, always feeble, often diseased, usually unproductive and worthless.

Mr. Williams being called upon to state his views upon the subject, said he "had paid attention to it for several years; this year had spent much time in visiting orchards and making observations. He believed that for the orchardist, trees worked standard high are better worth one dollar a tree, than to plant rootgrafted trees, receiving them and a dollar with each tree as a gratuity. Is acquainted with an orchard containing rootgrafted trees fifteen years old—have never borne well, some of them never an apple. Other trees, budded from them, in the same orchard, have borne good crops for seven years."

Mr. T. T. Lyon, in the Michigan Farmer, says: "It has long been urged by fruit growers upon prairies that rootgrafted trees are less hardy than seedlings, but never till the present season have we, in this region, witnessed occular proof to that effect. From the result of this year's experience, it is also clear that some varieties are less hardy than others, for while *rootgrafted* trees of some varieties have *suffered severely*, topgrafted trees of these varieties have *escaped entirely*."

From the Iowa Farmer we take the following: "Judge Green, of Cedar Rapids, has an extensive orchard of several thousand trees, mostly root grafts, planted five or six years since, in rows a quarter of a mile long, and extending from near the top of a ridge down a southern slope and across a gently inclined flat or bottom. * * * * The Judge, being an Eastern man, had very naturally secured a large number of Baldwins, Greenings, Spitzenbergs, Roxbury Russets, &c., perhaps most of which were planted on the low ground. Here they struggled on up to last winter, mostly living, but not doing as well as the same sorts up the slope. Thus standing, that trial winter came, and completely finished up and wiped out nearly every tree of the more tender sorts, making sad inroads upon the appearance and profitableness of the orchard. Trees of the tender kinds, up the slope were not indeed all killed outright, and should our seasons prove favorable for a term of years, they may possibly bring some fruit yet; but it would seem impossible for them to become permanently vigorous. Scarce a variety that we noticed, not even the hardiest, had done as well on the low as on the high ground. Of several tender or half-hardy sorts on the slope, *where a part were root grafted and a part budded on seedlings, in every case that we noticed, the latter were the most hardy and vigorous.*"

These statements suggest several remarks; and may also serve to throw some light on the reasons why root grafted trees have so generally failed here.

It would appear that some varieties are more likely to succeed when root grafted than others, which is also confirmed by experience everywhere else.

It seems probable, also, that some of the more popular New England varieties, such as the Baldwin, Russet, &c., are only half-hardy or tender in severe seasons, elsewhere as well as in Maine. Again, the exceptional and severe "trial winter," as it is called, was, after all, not so damaging in its effects as many which we have had: for there the Baldwin *stood well as budded trees*, while *they were killed outright when root grafted*. Now as there is no safety in planting budded trees of the Baldwin in Maine, (as a general rule,) such as there proved hardy when the same sort failed if root grafted, *the utter worthlessness of the latter for our planting* appears in a strong light.

The late William Reid of New Jersey, than whom no one was more competent to speak advisedly, in a communication to the Horticulturist writes as follows:

"I would, while speaking of the quality of trees grown in different sections of the country, call the attention of parties who are planting apple orchards to some defects not easily detected. I allude to the millions of apple trees that the country is being flooded with, and distributed in every corner of the land by persons calling themselves tree agents or pedlars, who come from Western New York. I allude to the trees known as root grafted trees. They are, to be sure, what they term them, root grafted; but the root, if root it may be called, is a very small root, or piece of a root, being only about two inches in length. A proper name to call them would be cuttings, for they are nothing more or less than apple trees grown from cuttings, the small piece of root only keeping the graft alive until the cutting begins to grow, which makes new roots of itself. The consequence will be, after a few years, or when they begin to bear, that a great proportion of them will blow down with the wind. Being only cuttings they are deficient in the strong roots which apple trees have when budded or grafted on seedling stocks above ground, and which are so necessary to make strong, healthy and permanent trees. And I would advise any person to have nothing to do with any apple tree that is not grafted above the ground. They are not only hardier but have roots to sustain them when they come into bearing and are of large size. This is one reason why so many trees now to be seen in the West that have been planted with these root cuttings are dying out in winter. Not only have they this objection, but they are nearly all more or less lurched over from the effect of the winds, and whoever plants them will be disappointed sooner or later.

It is not necessary now, if it ever was, to buy trees of travelling pedlars who have no fixed place of residence or respectability, and who are generally ignorant men, scarcely knowing the name of one tree from another, except what the circulars which they carry give them. I would again advise every person to send to a respectable nurseryman who will send them trees correct to name, who have reputation at stake, and who are generally competent to judge as to the varieties which are best adapted to the locality the purchaser lives in. I am satisfied that more loss and disappointment have been caused by pedlars selling worthless trees than would have sufficed to plant the whole Western States. In place of this they have now to begin and replant all the ground planted from 1850 to 1855." *

Grafting. The uses of grafting are many and various. The chief one is to change the head of a tree bearing inferior fruit, or of uncertain character, to another known to be desirable. We can in this way propagate choice varieties with an ease and rapidity impossible by any other method. By it we can also render dwarf certain fruit trees by working them upon different but kindred stocks which are of slower growth, and thereby attain valuable results; as with the apple upon the paradise stock, and the pear upon the quince stock. Seedling fruits, or those known to be usually tardy in bearing, can be fruited much sooner by grafting them upon the limbs of grown trees of the same species.

Not least among its uses, is its enabling us to grow successfully

* While revising proof, an article is observed in Hovey's Magazine of Horticulture, written by a resident of Rochester, New York, stating at some length what may be said both for and against the practice of root grafting, and I quote a sentence or two as containing the pith and point of it. "Its principal advantage is *to the nurseryman* in economizing labor," &c. * * * "The disadvantages of this mode of propagation *fall chiefly upon the orchardist*," &c. Nothing could be more frank and to the point than this.

many sorts otherwise too tender, uncertain, or of feeble growth, by grafting them upon well-grown, hardy, vigorous native trees known to be well adapted to the soil and climate.

The plant or limb upon which a graft is set is called a *stock*, (*not stalk*). The stock and the graft (be it a scion or a single leaf bud) form a partnership, the former furnishing the raw material, by the roots, and the latter, by its leaves, digesting it, and manufacturing the product. It is based on the power of union between young tissues. When similar parts are accurately fitted to each other, the sap passes from one to the other, and under favorable conditions, granulations are soon thrown out and a lasting junction effected.

Success is confined within certain limits. It is greatest between varieties of the same species, as the apple upon the apple—next between species belonging to the same genus; as the pear on the quince; and lastly between genera of the same natural order. These last are of short duration and for the most part useless. Between those less nearly allied, no union is effected. The practicable range for useful purposes, with us, extends little beyond the following: The apple upon the common apple and the crab for orchard trees, and upon the doucain and paradise for garden culture The pear upon the pear for orchards, and upon the quince for dwarf trees to receive garden culture. Some varieties of the pear have succeeded tolerably on the Mountain Ash, (*Pyrus Americana*,) the White Thorn, (*Crateagus Coccinea*) and upon the Shadbush, commonly called Sugar Pear, or Juneberry, (*Amelanchier Canadensis*,) these being all closely allied species.

Where the cherry succeeds, it may be worked either on the Mazzard for large trees, or on the Mahaleb for dwarfs. The plum has been budded on the peach, giving trees of rapid growth but short lived; and the peach upon the plum, but the trees although hardier than when on their own stock, have rarely given much satisfaction. Little success can be expected in this State with the finer cherries except in very favorable localities and soils, nor with the peach in the open air, except it be *trained very low*, so as to be covered with snow during winter.

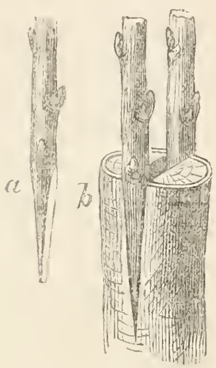
The old adage that "the scion overruleth wholly, the stock being merely passive," needs some modifications, for to a certain extent the stock exerts an influence. A plum budded upon the peach is furnished with an unwonted supply of sap, and grows more rapidly than upon its own stock. The pear grafted upon the quince receives less than its usual supply of sap, and forms a smaller tree than if worked on the pear stock: and its growth being checked somewhat, it comes earlier into bearing. Let a row of seedling apples be grafted, a part with the Siberian Crab Apple, and a part with several free-growing kinds like the Baldwin or Greening, and it will be found upon lifting them a few years after grafting, that the former have a much greater amount of roots than either of the free-growing sorts. Let part of a row of young Canada plums (our common wild plum, sometimes wrongly called pomegranates,) be budded with the better and more free-growing sorts, like Imperial Gage, Smith's Orleans, or McLaughlin, and after two or three years, upon lifting them, it will be found that the roots of those thus grafted have not, apparently, grown at all since being budded, while those not worked have extended very much. These and similar cases I have repeatedly observed in nursery practice, and there are doubtless other influences also exerted by the stock which are not well understood—for instance, it is said that sometimes an apple, usually free from this defect, has become what is called *water-cored*, in consequence of having been grafted upon a tree, the natural fruit of which was thus affected. It is not unlikely that some other modifications of the fruit may be effected, but they are, on the whole, inconsiderable. To a very great extent it is true that the scion overruleth.

For scions we cut the twigs of the previous season's growth, selecting these well grown and thoroughly ripened. As a general rule grafting succeeds better when the scions have been cut some time previously to being set. They may be cut at any time from the fall of the leaf until the buds swell. With *perfectly hardy* sorts, March is as good a time as any, but generally my preference is for November. They may be kept in boxes with moss just damp enough to allow of no change in the moisture of the scion. Too much dampness is equally to be avoided with too little. If closely packed with plenty of moss and kept in a cool place, they come out in the finest possible condition in spring; and I have kept them thus even until another season; or they may be buried in the ground, for which purpose select a light sandy soil in a place so dry that no excess of water ever accumulates in it.

The better time for grafting plums and cherries is before the frost leaves the ground. Apples and pears a week or two before the buds of the stocks begin to swell. If need be, the latter may be grafted later, even until the buds have swollen considerably, or have leaved out; or if more convenient it may be done a month before they swell. As a matter of curiosity, grafting has been performed successfully in every month in the year.

Numerous methods of grafting have been practiced, but as a few of the simpler ones will serve all the purposes of the orchardist, these only will be described.

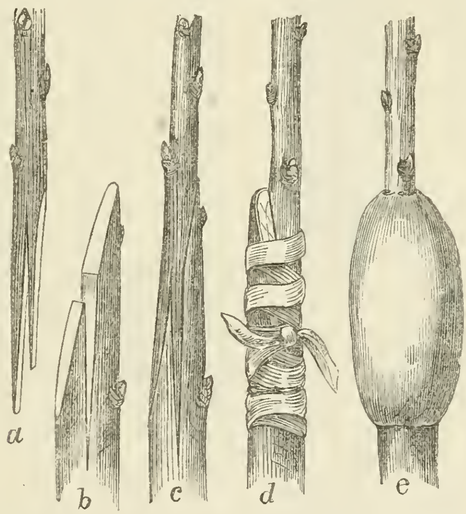
Cleft Grafting. This is the method most commonly in use to change the tops of grown trees. The limb is sawn off and the end smoothly pared with a knife. Then with a grafting knife and hammer it is cleft in the centre and kept open by a wedge. The scion is cut smoothly on both sides in the form of a wedge, for an inch to two inches, or as long as can be nicely fitted to the cleft. Cut so as to leave a bud just above the scarf, and the scion may be cut long enough to have two or three other buds above that one. Very large scions may be cut with shoulders, to avoid too wide a cleft. In setting the scion in the stock, be careful that *the line of union between the wood and the bark of each coincide exactly.* If the stock be wide enough for two scions, insert another on the other side, in the same way; then withdraw the wedge and cover the wound with grafting wax to exclude the air perfectly. If inserted long before growth commences, it is well, also, to wax the end of the scion. If only one scion is inserted, the stock may be cut away on the other side before applying the wax. If two are inserted and both grow, cut the weaker one away after a year or two, as otherwise there is danger that the limb eventually will split down. The most important points in all grafting are, *to have similar parts nicely adapted to each other, so that the sap may pass uninterruptedly from one to the other*: and next, that the parts be properly protected until a perfect junction is formed.



(*a*). Scion ready for insertion. (*b*). Stock with two scions inserted.

Splice Grafting. This is used chiefly in the nursery and upon small stocks. It is also employed when we desire to obtain fruit as soon as possible from a seedling variety. For the latter purpose a scion is grafted upon the end of a limb of a grown tree. In this case but little growth is attained, and little is wanted, for we cannot expect fruit buds to form on a rapidly growing shoot, because the growing and the fruiting forces are, as was remarked before, antagonistic in their character, and one or the other must give way, at least temporarily, or to a certain extent, in all cases. In splice grafting, the stock and scion are to be of the same size—each is to be cut obliquely for one or two inches, and the parts accurately fitted to each other, when a bass string is to be wound about it and covered with wax—or, better still, let it be wound about with a narrow strip of waxed cloth.

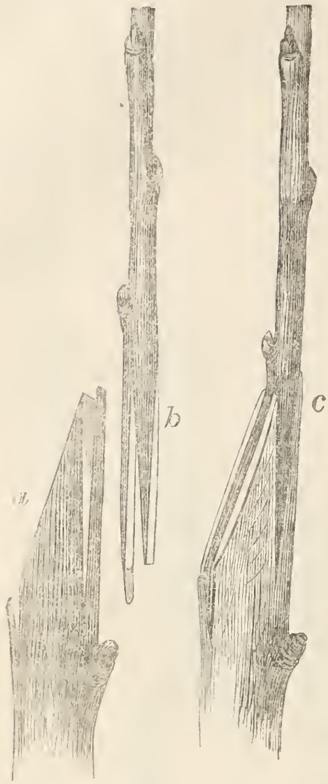
Tongue Grafting is similar to the above, except that a tongue is cut in both scion and stock, and one fitted to the other. This is one of the best methods of grafting in all cases where the stocks are not too large, say from half an inch to three fourths or even a whole inch. If the stock be larger than the scion this is decidedly preferable to the last. In this case care should be used, however, to have similar parts joined carefully *on one side.*



TONGUE GRAFTING IN ITS DIFFERENT STAGES.

(*a*). Scion cut for insertion. (*b*). Stock prepared to receive the scion. (*c*). Stock and scion united. (*d*). The same tied up. (*e*). Do. waxed or clayed for protection.

Saddle Grafting is more easily performed by the following method than by the one usually described in the books. Cut off the stock, which should be from half an inch to an inch in diameter, (I have seen it perfectly successful when nearly two inches in diameter,) with a sloping upward cut of an inch or two. Then, directly opposite this, cut downward perpendicularly, taking the bark and a thin slice of wood. Cut the scion upward, dividing it for the same distance into two unequal parts, leaving a bud at the top of the cut; then cut the thicker part of the scion so as to leave it wedge shaped; place this wedge shaped part into the back part of the stock and draw the thinner part over the slanting cut of the stock; fit the parts closely, tie and wax.*



SADDLE GRAFTING.
(*a*). Stock. (*b*). Scion. (*c*). Stock and scion joined.

Bud-Grafting or *Budding*, as it is commonly called, (*inoculation* of the old authors,) is the easiest and best mode of working small stocks. It differs from ordinary grafting mainly in the use of a single bud in the place of a scion bearing several buds, and in being performed in late summer instead of spring. It may be performed in spring, as soon as the bark peels freely, using scions of the previous years' growth which have been carefully kept in good condition; but this is rarely advisable, and perhaps only when we have a very valuable scion which it is desired by subdivision to increase the chance of saving, or to work as many stocks with it as there are buds upon it.

To insure success in budding, several conditions are essential. The most important of these are, 1st, *That the bark of the stock should part freely from the wood*; for if, either by reason of the season of the year, or the feeble condition of the stock, the bark ad-

* Substantially the same method is described by Dr. Weston on page 36, as also a method of grafting under the bark.

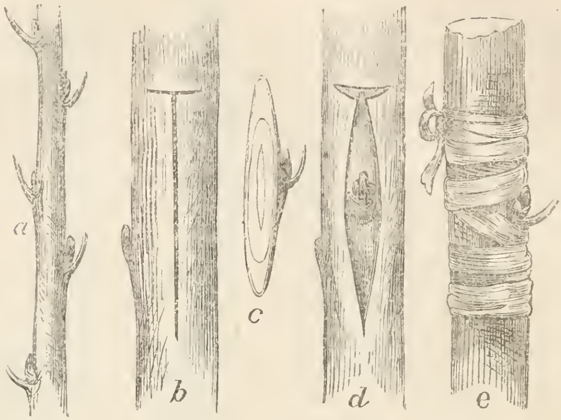
heres to the wood, the operation will certainly fail. 2d, *That the bud to be inserted should be properly ripened;* as otherwise it will not have vital energy enough to establish itself in its new home. With ripe, plump buds and a freely flowing sap, union between the bark of the bud and the alburnum of the stock will be easily and speedily effected.

The *proper time for budding* varies with circumstances; as whether the season, be a wet or a dry one; the age and condition of the stocks, &c. In average seasons I have usually been most successful with plums and cherries from the middle to the end of July, with pears from the twentieth of July to the fifth of August, and with apples, from the fifth to the twentieth of August.

To prepare scions for budding, select well grown shoots of the present year's growth; cut off and reject all imperfectly developed buds at the lower end, and all unripe ones towards the top; then cut off the leaves from the remainder at a point about the middle of the stems, leaving part of the foot-stalk of each, by which the better to handle the bud. In this condition the scions may be kept, if need be, for a week or ten days, or be carried a considerable distance if wrapped in damp moss. Where scions are plenty, only a few of the best buds in the middle of the shoot should be used, as those below are apt to be backward about starting into growth the next spring, while those at the upper part, being easily excited, are more liable to start into growth the same season, and especially if wet, warm weather ensues; in which case the young shoots are sure to be killed or injured the following winter. When the variety used is scarce and valuable, we would take more risk and insert some which would otherwise be rejected.

The preferable size for stocks to be budded is half an inch in diameter, (from one quarter to three quarters of an inch is the usual range); though sometimes both larger and smaller stocks are worked by this mode.

There are many methods of performing this operation; but the most common and the best, is what is called shield or T budding. It is performed as follows: Select a smooth part of the stock, then with a sharp budding knife make a horizontal cut across the bark quite through to the wood; from the middle of this cut make a slit downwards an inch or more long, going also through to the wood; so that both cuts taken together shall resemble a letter T. Next cut from your scion a thin slice of bark with a little wood in the central portion of it, entering the knife about half an inch below, and bringing it out about as far above a bud. This slice of bark and wood taken together is technically called a bud—the part which grows into a shoot (i. e. the bud proper) being known as its *eye*.



SHIELD BUDDING—DIFFERENT STAGES.

(*a*). Stick of buds. (*b*). Showing the T shaped cut in the bark of stock. (*c*). Bud ready for insertion. (*d*). Stock with bud inserted. (*e*). Same tied up.

With the ivory haft of the budding knife, or if you have not such a knife, with a wedge of wood or ivory, gently raise the bark, beginning at the corners of the slit in the stock. Be very careful that the *cambium* or sliver be not disturbed or injured in the least. Then taking hold of the bud by its foot-stalk, insert it and gently push it down to the bottom of the incision. The eye of the bud will now be about half an inch below the horizontal cut. That part of the bud, if any, projecting above this should be cut off by passing the knife through it into the transverse slit again so that a good joint be made.

A bass string, or some other which is soft and pliable, is now to be wound tightly about it, beginning at the bottom and covering every part except the eye of the bud and its foot-stalk, and tying it above the horizontal cut. The success of the operation, so far as its execution is concerned, depends mainly on smooth cuts, an exact fit of the bud to the incision made for it, and close tying. Cloudy and moist weather is more favorable than a hot sun and a dry day. In ten days or a fortnight, examine the buds and if they be found plump and full, the operation has been successful, and the string, if too tight, should be removed, and tied again more loosely, and above the bud only; in another fortnight it is well to remove the string entirely.

When the buds swell the following spring, the stock is to be cut off three or four inches above the bud. So much of the stock it is well leave in order to tie the bud to it, as it grows, to prevent the shoot from being blown out by high winds. All other shoots from the stock (the robbers as they are called) are to be rubbed off as often as they appear. The spring following the stock may be cut off smoothly close to the bud.

(*a*). Stock as left the first season. (*b*). Dotted line showing where it is to be cut off smoothly the second year.

Cuttings and Layers. Some fruits, as the quince, gooseberry, grape and currant, are propagated usually in this way. Cuttings consist of shoots of the previous year's growth, and are of any length from a single eye or bud to a foot or more long. Usually they are made from eight to ten inches in length; are cut in the fall and planted out early the next spring in well prepared soil, so that only two or three buds are above the surface. Mulching, by covering the ground with coarse manure, leaves, seaweed or litter of some sort, is useful in preserving an even moisture in the soil. The grape is sometimes propagated by cuttings of a single bud each. These should be planted in a hot-bed, nearly spent, so as to afford a gentle bottom heat.

A *Layer* is a cutting which has been prepared one or two years previously. A shoot starting from near the ground is bent down and the lower portion confined by a hooked peg and then covered with soil. Success is rendered more certain by checking the return flow of sap, which may be done by twisting the shoot at the point covered, or better still, by entering a knife on the under side and cutting upward half way through the shoot, thus forming a tongue, and fastening it open with a little soil. The sap as it returns is here stopped and forms, first granulations and then roots. When the layer is sufficiently rooted it may be removed and planted out by itself.

Trees are sometimes purposely kept headed down for raising layers, and are then called *stools.* A quince plant thus made into a stool, and its twigs layered, may be made to produce many finely rooted plants in a single season. This method is largely used for growing young plants of the quince and the Paradise apple to be used as stocks for dwarf trees.

Soil and Situation. Let us suppose the nursery work to be well advanced and a sufficient number of young trees ready for removal to the orchard; what then? Why, transplant them to be sure. But let us inquire whether we be not rather fast, for this should have been borne in mind for the past year or two, or for several years, while the young trees were coming on, and a suitable place selected and prepared to receive them. This cannot be done in a day, although some act as if they thought so, but this does not make it so, any more than because they also think that transplanting and after culture consists in crowding the roots into a small hole and covering them with the sods taken out, and thereafter letting the tree alone to struggle for existence, makes that so.

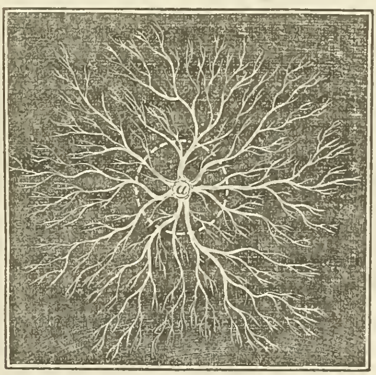
An orchard should be looked upon as *a long investment,* a crop to be harvested during half a century, and deserving of proper selection of place and preparation of it at the outset, and careful treatment all the while it is bearing; just as really as a crop of Indian corn deserves preparation of soil, manuring, hoeing and care until the harvest is finished.

The situation selected for an orchard should be good upland, with a *dry subsoil.* Side hills and elevated ridges often furnish the best, especially for apple orchards, and sometimes even where they are too rocky to admit of cultivation. These as well as other uplands are sometimes wet and springy, *in which case underdaining is indispensable.* Cold water is excellent in its place, but is not good for the roots of fruit trees, and though they may struggle along for a while, they can never thrive with wet feet the year round. As a general rule, good corn land is good orchard land, but the rule is not without exceptions, for corn sometimes does well on intervals where fruit trees would not be safe in winter.

Next in importance to dryness of subsoil, I would rank the quality and character of the soil itself. The apple will grow on a great variety of soils but it likes best a deep gravelly strong loam, alike removed from mere sand, gravel or clay, and if calcareous, all the better. It should be good enough to yield from twenty-five to thirty-five bushels of Indian corn to the acre. If not good enough to do this, make it so, or try elsewhere; unless it possesses some peculiar excellencies for orchard use, aside from what would be requisite for corn.

The ground, if not too rocky to preclude its possibility, should be well prepared and mellowed by cultivation for a year or two previous; so that the sward, if it has been in grass, be well reduced; and before planting it should be *subsoiled.* If a subsoil plow cannot be had, trench plowing, by running the plow a second time in the same furrow, will loosen the soil to a greater depth, but with the disadvantage of bringing more of the subsoil to the surface than is desirable.

Transplanting. The skill, or the lack of it, with which transplanting is performed, has so much to do with subsequent success or failure, that it is of great importance that it be done properly. Some people plant a tree as they would a post, apparently thinking that the office of the root is only or mainly to keep the stem in an upright position; but no view could be more erroneous, for the roots are the *true feeders,* as well as the mechanical supporters of a tree, and they require a pasturage ground, good enough and of sufficient extent, and also an opportunity to avail themselves of it. Transplanting, at best, is an act of violence, (unless the plant moved has been grown in a pot, so that the roots can be secured entire). It is impossible to transplant from the open ground without a greater or less mutilation of the roots, and the less the better. Very few are aware of the actual extent of this multilation in ordinary practice. The subjoined cut may help give some



idea of it; (*a*) denoting the collar of the tree, and the dotted circle marking the extent of the roots lifted with the tree; those outside of it being left in the ground. As before remarked, the roots usually extend as far as the tops, sometimes considerably farther; and as it is only at the extremities that the spongioles or feeders are found, there is reason to believe that more than three fourths of them are usually lost in lifting. Some kinds of trees bear the loss, and recover from it, much more readily than others, as, for instance, the pear on quince root, which has the power of emitting new roots with greater facility than almost any other fruit tree; while the cherry is more uncertain because it emits new roots with greater difficulty. The following brief rules may be given as covering the principal points to be observed in transplanting:

If the trees have come from a distance, and have become dry and shrivelled, let them be buried in the earth, root and branch, until they are plump and full. Then shorten the top in some measure proportionate to the loss of roots, by cutting in last year's shoots; if the trees have a fair proportion of roots, this heading in should not be severe, and if, in addition, the planting be well done, and the trees properly mulched, it may be omitted entirely; in which case they should have a *moderate heading back the following year,* which will then result in more vigorous growth. The more top is left, if the tree does well, the more fibrous roots will be made the season following the planting. Next cut off *smoothly* the end of every root, taking away any bruised portions. A finger, amputated by a spade cut, may be expected to heal as kindly as a root so treated; both are alike portions of organized tissue, and subject to the laws of life.

The holes being large enough to allow every root its natural position, without bending or crowding, spread out the fibres in every direction as widely and evenly as possible, while fine mould is sifted among them; one person holding the tree, while another fills in. Let every root be *in close contact with the soil, and no vacancy allowed,* which would produce mould or decay. When nearly filled, pour in a few quarts of water from a watering-pot to settle the earth among the fine roots, and complete the filling with dry, mellow surface soil.

Apples and pears on their own roots, also cherries and plums (as well as trees and plants generally) are to be set *at the same depth* at which they stood in the nursery—unless the situation be a moist one,* in which case they should be set higher, and the

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* If trees *must* be set where there is a liability of the ground becoming saturated with water at any season, they may be set *on the surface*, without digging any hole, raising the earth about them to the proper height.

earth about them raised in a corresponding degree. *Pears upon quince roots* should be set so that the point of junction between the pear and quince be *three inches below* the surface. *Dwarf apples* may be set so that the junction shall be *just even* with the surface.

When the tree is set, do not neglect to *mulch* it, by laying around for a distance of three or four feet, and two or three inches in depth, a covering of some kind—coarse manure and half-rotted leaves from the forest are the best materials. If these are not to be had, refuse hay, straw or seaweed answer a good purpose, and even spent tan or sawdust are better than nothing. This covering preserves a uniformity of moisture and of temperature about the roots, and is of great value throughout the whole of the first year's growth. In nearly all cases, it obviates any need of subsequent watering, which as often done, is a most injurious practice; it being as easy to kill a recently transplanted tree by drowning as by drouth; and sometimes trees are killed by *drouth caused by watering*, which happens when a little is poured over the surface causing the formation of a hard crust, and thus preventing the soil from retaining moisture. If it becomes necessary to apply water, first remove the mulch and a little of the earth, and after watering replace them both.

Season. There is considerable difference of opinion whether autumn or spring is the better time for this operation. Both have their advantages and disadvantages. If set in the fall there is the danger of winter killing and crushing by the snows of one season, or, if the ground be bare, of the roots being injured by excessive freezing, or freezing and thawing alternately. On the other hand, it is a season of more leisure, and the work is likely to be more faithfully done, and if not quite so well done as it should be, the latter rains settle the earth more completely about the roots. The ground, too, is in better condition to work, and what perhaps is the chief advantage, trees set in autumn, although they do not start so early and vigorously, suffer much less from the droughts of summer. Autumn planting succeeds far better in light, dry soils than in heavy loams. In any soil it is needful to pile a little hillock of earth about the tree after planting, to be removed in spring and replaced by a mulch. If there be any doubt as to the hardiness of the tree planted, spring should be preferred. When planted in spring, *the earlier it is done, after the ground is in proper condition to work, the better.* A very common error is to defer it too long.

When trees or plants are to be procured from any distance, they should be purchased and got home in autumn, if possible, even if the intention be to plant in spring, as, by being "heeled in," they can be kept in better condition than if left in the nursery rows during winter, and the trees are at hand ready to be set on the first favorable opportunity; whereas, if left until spring, other work is apt to delay or interfere, and the order reaches the nurserymen when scores or hundreds of other orders are on hand, waiting their turn, to be executed; those sending for them all anxious to be served at once, while the period suitable for lifting and transplanting is very brief, much shorter than in districts farther south. Indeed, comparatively speaking, we have no spring here, the transition from winter to summer being so abrupt.

The "heeling in," or "laying in by the heels," alluded to, is a sort of temporary planting. Let a trench be dug in *dry soil* deep enough to cover the roots and half the tops, place them in a sloping position and cover with earth, carefully filling every interstice among the roots, and heaping the earth over them. The tops may be covered with evergreen boughs. They are thus kept in the best possible condition. When trees are received in spring, the bundles should be opened and the trees heeled in at once—at least if they are not to be planted within an hour. Never let them suffer any needless exposure in any way.

To the other advantages of procuring trees in autumn may be added that of *obtaining a better selection*, inasmuch as all nurseries, of any repute, are more or less severely thinned by a season's sale, and the stock of some desirable sorts often exhausted.

Distances between trees. It is not possible to state definitely any given distance as the best at which to plant apple trees or other fruit trees. Different sorts need different distances, some a good deal more than others: something also depends on soil, circumstances and intentions. I have seen some very good apple orchards which were planted at only a rod apart; and some others which were planted at forty feet apart. In the first, one half to three quarters of the trees had been removed by accident, disease or design. They were planted close purposely; in part to provide against losses from both unforseen and anticipated contingencies, and partly for the shelter and protection furnished by one to another.

Mature trees, of large growing sorts, like the Winthrop Greening or Yellow Bellflower, are near enough at thirty-five to forty feet asunder, for they actually need the twelve hundred to sixteen hundred square feet of surface which this distance gives. Other varieties, of smaller growth, like the Duchess of Oldenburg, Garden Royal, and the like, have as much room in proportion to their needs with a third part as much space—say at twenty feet asunder, thus giving them four hundred square feet each. For an orchard of apples of mixed sorts it may be a good plan in many cases to put the rows thirty feet or two rods apart, and the trees in the rows at twenty feet apart. This gives an average of 600 feet to each tree, and allows more room for the wagon, plow and cultivator.

Suitable comparative distances between trees of different species and on different stocks may be stated as follows:

Standard apples on free stock,	20 to 30 feet.
Dwarf apples on Doucain stock,	8 to 12 "
" " on French Paradise,	5 to 6 "
Standard pears on pear stock,	14 to 20 "
Dwarf pears on quince stock,	8 to 12 "
Cherries on Mazzard stock,	18 to 25 "
" on Mahaleb stock,	10 to 14 "
Plums,	10 to 14 "

Number of trees which may be planted on an acre at different distances:

At 4 feet apart each way,	2721
" 8 " " " "	680
" 10 " " " "	435
" 12 " " " "	302
" one rod " " "	160
" 20 feet " " "	109
" 25 " " " "	70
" 30 " " " "	48
" 35 " " " "	36

Size of trees for planting. A very common error among beginners in fruit culture is to desire trees of too large size. They are very anxious to see fruit at the earliest possible moment. Such would gladly buy a ready made orchard or fruit garden for replanting, if they could. One person about to set out an orchard wrote to a nurseryman, "Send me *man* trees. I do not want any puny little children, but large, full-grown specimens." Another said, "I want the largest trees you have." "But," said the nurseryman, "smaller ones will be better in five years than these." "I don't care; I want big ones; I may not live five years, and I want fruit *now*." Three or four years later the same planter called again. Without waiting for an inquiry, the nurseryman remarked, "Well, I have some fine large trees for you now." "Don't want 'em! Don't want 'em!" was the answer; "I have had enough of large trees. They have cost me ten times as much trouble as the small ones I took from necessity, and they have not grown an inch. I have nursed them and doctored them, and they are the same size as when I got them, and they bear a little half-sized fruit. The small ones have gone by them, and are bearing fine large excellent specimens."

When the trees are on one's own land and only to be removed a short distance, they can be successfully planted of larger size than if they are to be packed and transported a considerable distance; but even then, those of six or seven feet in height are far better than larger ones, and probably others half as large would soon outstrip them. Experience is a very effectual teacher on this point, and I have never seen a cultivator, whatever his age, who had learned the lessons of ten years' experience and was still afraid of a small tree—no matter how small, almost, so it be healthy and thrifty. J. J. Thomas remarks: "When trees are to be sent some distance the increased cost of larger ones in conveyance, in risk and in packing is greater than a hasty observer has any idea of. A tree, for example, which is twice the height and diameter of another, is greater in weight in a cubic ratio. If a hundred of the smaller weigh two hundred pounds, one hundred of the larger will weigh eight hundred pounds, eight being the cube of two. A single season's growth in the nursery often makes this difference when young; but it requires many years after being checked by removal when large. There seems, indeed, to be every reason why trees should be removed small, and everything against removal when large. There is only one instance in which the larger trees can have any advantage, or can maintain it for two or three years, and this is when both large and small are treated with total neglect after setting out, so as barely to survive and not grow at all. Both remaining stationary, the larger ones will of course maintain their superiority in size. But all good cultivators discard such treatment. Sir Joshua Reynolds said if he were to paint a picture of Folly, it would be by representing a boy climbing over a high wall with an open gate by his side. Had he lived now, he might do it with equal effect by representing a purchaser selecting large trees at a nursery and rejecting young thrifty ones."

Shelter.

Planting of Screens. The importance of shelter has already been several times alluded to, and a word may here be in place as to the better mode of securing it. It is well to have an evergreen screen or belt on all sides of the orchard; and if it be a large one, to have one or two running through it; but at least the two sides which are most exposed to injurious winds should be well protected.

Our common Spruces, Black and White, Balsam Firs and White Cedar (Arbor Vitæ) are the most available for the purpose. The Hemlock would make a more beautiful one, but it is very impatient of transplanting unless quite small, say only a few inches high. The common and almost universal error of all beginners is, to plant evergreens of too large size. Unless they have been previously grown in a nursery and several times transplanted when quite small, *none* should be set over two feet high, and one foot is much better. Let them be taken from open pastures in preference to the forests and take as much earth as will adhere to the roots. Be careful, also, that the roots do not dry in the least, and plant as soon as possible, in trenches previously prepared, and ready to receive them. A strip of land should be prepared at least one year previously, by plowing several furrows and planting it with potatoes or other hoed crop. May is the best month for moving evergreens, or until they have made an inch or two of new growth. Never prune them, and especially not by removing the lower limbs, as both their beauty and efficiency depend upon a dense pyramidal growth. Choose damp weather for transplanting. They may be set anywhere from three to six feet apart, and if you set out several rows, so as to form a dense *belt*, all the better. If the plants are small and good, and the operation well conducted, you may expect a dense screen fifteen or twenty feet high in ten or twelve years; and to be repaid, many times over, for the trouble, in the increased health, vigor and productiveness of the orchard.*

* "All who are conversant with the progress of arboricultural art in Great Britain are well aware of the necessity of protection to what we consider one of the hardiest of all trees, the oak; and that no plantation is completely successful which does not have it. For a time the opinions of planters were divided in this respect, but when Government undertook the planting of the Royal Forests of 40,000 acres, the experi-

After Culture.

Fruit trees require attention and *cultivation*, as really as corn and potatoes; and they should have both, not merely for the first year or the first five years, but as long as they need it and pay for it.

Many a man has procured good trees, planted them skillfully and carefully, and thenceforward treated them to forgetfulness and neglect. Almost as well might he have spared the expense and trouble thus far incurred, as to leave them to struggle unaided, in competition with weeds, grass, moss, insects, and perhaps poverty also, and whatever else they may have to contend with. When good seed is put in good ground, we deem culture well begun, but not completed. Corn and carrots get attention as long as they

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ment was fully tried, and with decided results in favor of shelter as the following report by the Government commission shows.

"'Accordingly in the most favorable soils and situations oaks only were planted at first; but in spots where it was thought doubtful whether oaks would grow, Scotch pines were planted with a small proportion of oaks intermixed; and it was soon found that in many of these spots, even under the disadvantage of inferior soil and greater exposure, such was the benefit derived from the warmth and shelter of the pines, that the oaks far outgrew their neighbors planted in more favorable soils, but without protection. After this the use of Scotch pines become more general; strong belts were planted on the most exposed outsides of the plantation, and also across, at intervals, in lines, towards the most prevailing winds, and from them great benefit was found; but in all cases where oaks were planted actually amongst the pines and surrounded by them, the oaks were found to be much the best.'

"Here we have the best of evidence of the importance of shelter even to an oak in the mild climate of England. And shall we suppose that a fruit tree needs less protection to produce its fruit aside from the mere growth of the tree? If the oak, planted with a view simply to grow timber, must be nursed while young by larches and pines, shall not a pear tree, cultivated for its delicious fruit, have equal care? The answer is plain. Every intelligent cultivator must be aware of the necessity of shelter, and he who expects to succeed without it, is wanting in that experience and knowledge which alone can insure profitable results. It is the key to the cause of many failures, of the death of trees by exposure in winter; of the loss of a crop by the dropping of their blossoms; of the spotting and cracking of the fruit in exposed situations, and in fine, the want of growth and vigor in numerous localities.

"A successful instance of overcoming obstacles of this kind and a decided evidence of the importance of shelter we have in the experiment of Mr. Tudor, at Nahant, Mass., where by means of triple palings of great height the temperature of several acres has been so changed, that while in the coldest winter the earth is frozen only a foot in depth, the soil on the outside freezes three or four feet deep; and in summer when there is scarce wind enough inside to rustle the leaves of the trees, on the outside they were moved with such violence as to dislodge them and even bruise their branches. Here, where scarcely any tree could be made to stand the blast unprotected, in the garden the finest pears are raised in the greatest perfection."—[Hovey's Magazine, Vol. XXI.

promise to pay for it. Why not fruit trees also? What matters it if no pay comes for the first year, or for the first five years, if it comes in good time, and through a long series of years, and with very large interest?

While the trees are young, the ground should be used for some crop which requires the frequent use of the plow, cultivator or hoe, so that it be kept mellow and clean; and the deeper the land is stirred, the better for the trees: but as they advance in size, *deep* stirring is less admissible, and any crop or treatment which serves to keep the land mellow and clean will answer. When too large to admit of easy cultivation, apple orchards may be laid down to grass, with a good share of clover, but *never*, on any account, *allow the sowing of oats or any other small grain.* After being laid down, unless the grass is fed off by sheep (the best way by all odds), the orchard will require manuring. Is it too much to demand double crops, and the main crop a good one, without feeding the land to meet the demand.

A common practice with some who desire to bestow good treatment is, to keep a circle of four to six feet around each tree well hoed and manured after the rest of the ground is in grass. This is good so far as it goes, and is admissible in the case of trees in grass grounds near buildings, where we cannot well dispense with the grass; but for orchard practice, and to cater for the wants of the great majority of the little rootlets, the true feeders of the tree, it would be much better to have an equal space next the tree in grass with the rest of it cultivated, (see page 141, near bottom).

By adopting the plan of planting the trees rather thickly in rows wide enough asunder to admit of easy working with the plow in one direction between them, partial cultivation of the soil may be kept up with ease for some years later than it could if the trees were at equal distances in both directions.

In the case of apple orchards on hill sides, or upon lands too rocky for cultivation, the best method undoubtedly is to occupy them for sheep ranges. Whatever the treatment adopted, let it be remembered that much profit cannot be expected unless the trees are thrifty, nor can we form a correct estimate of the real capabilities of any fruit, as to size, flavor or productiveness from the product of unthrifty trees.

Regarding the propriety of using orchards in grass for sheep ranges, I will add here the testimony of one of the best cultivators in the State, who assured me that one of his orchards now produces *ten times the value* of crop that it did ten years ago, and he attributes the improvement wholly to the fact that of late years it has been pastured with sheep, whereas formerly the grass was mown.

In the case of young apple trees (and sometimes with older ones, but less frequently), there is need of adopting some means to prevent the sheep from barking the trees. A highly esteemed correspondent and skillful cultivator writes, "My course with a young orchard is to mulch the trees well on setting, and continue it for some years. My orchards are pastured with sheep—first coating the trunks with green dung mixed with soapsuds, which is repulsive to the sheep and good for the trees; or else I take five or six laths and tack them, near together, to two strips of leather—stand the laths around the tree (having previously cut them so as to come up only to the branches) and tie them with the leather strings at top and bottom. After pasturing for five years the land becomes so rich the sheep do not like the feed. I then plow carefully and re-seed the land."

Pruning. Concerning the motion and circulation of vegetable fluids, we are very much in the dark. Although volumes have been written on the subject, no one yet knows enough to determine with certainty the best time to prune a tree. Opinions vary, and practice varies greatly. Something has been learned by experience, but what we don't know is greatly more than is known. This much is sure: any needless mutilation of a tree is injurious, and should be carefully avoided. We know, too, that severe pruning may be practised with comparative safety upon young trees; of which we have evidence in the impunity with which they are headed down in the nursery for grafting, or after being budded.

After this heading back pruning, is chiefly required, when young, to give proper form to the top, and this, if well done, obviates the need of any heavy pruning subsequently. An esteemed correspondent writes as follows: "There is one point to which I wish to call the attention of orchardists, viz., that young orchards should be early trained in the way they should grow. I speak feelingly on this point, having had to do with some trees which were sadly neglected until ready to split down, covered with diseased spots, and tops so tangled that it was difficult to get at the (often imperfect) fruit. A well balanced top is attractive to all who have an eye for beauty as well as utility. My pocket knife is an almost indispensable companion in passing among the orchard trees and take off sprouts wrongly inclined, and small branches, or to mark those to be cut off subsequently."

Pruning is an operation where more judgment is required than in almost any other operation in the nursery or orchard. Definite rules cannot be laid down to meet all cases. If the tree is naturally inclined to a close and upright head, as with the Northern Spy apple and the Buffum pear, encourage spreading shoots, and thin the top sufficiently to let in the sun and air. If, on the other hand, it incline to a spreading habit, encourage an upward growth. Aim at symmetry of development. Take away, as early as may be, all cross shoots which by and by may be chafing others.

In proportion as trees grow older, more caution is needful to effect a gradual rather than a sudden reduction of the top. When trees become stunted or unthrifty, a moderate heading back, accompanied with manuring and cultivation, will often work a surprising change for the better. If the fruit of a large tree be poor and it is desired to graft a new top upon it, let it be done gradually, beginning with the centre of the top, or if unthrifty, head in that portion, and after the emission of vigorous shoots, graft into them, and afterward into the others. Fruit, in abundance, can be thus obtained from trees not too old or too far gone, in a much shorter period than by planting young trees.

The following from Mr. Olmstead, in the Horticulturist, is an instance of success attending good management:

"These trees I commenced grafting six years ago last spring. I began on the top and grafted a third each year. I like this method better than any other for grafting large trees, as it gives the scions a good opportunity to get well started. Cutting off and grafting the top first, gives the grafts there the best possible chance, while the necessary reduction of the top throws the sap into the remaining side branches, which fits them well for grafting the following year; and the third year, the lowest branches, being made ready in the same way, may be grafted successfully. By this mode, it will be seen that when the grafts are put in the side branches they are not shaded by the heavy shoots above them and they have an unusual supply of nourishment to carry them forward. Those who have attempted to graft the whole head of a large tree at once are best aware of the great difficulty in the common mode of getting the scions to take on the side limbs.

One of these large trees so treated is probably more than seventy-five years old and has now an entirely new and vigorous head, grafted with an excellent variety. When I began with it, the fruit was fit only for cider, and it was questionable whether the tree should not be cut down. By grafting it in this manner, I have added surprisingly to its value. Two years ago (the bearing year) I obtained from it ten bushels of apples, last year eight bushels, and this year (the sixth from grafting) twenty-eight and a half bushels of excellent fruit. I consider the tree now worth a hundred dollars. The cost of grafting was about five dollars, which was repaid two years ago, the first in which the scion bore fruit."

As to the better season for pruning, may own opinion is that June is preferable for small limbs or shoots, and October when large limbs from any cause *must be removed.* Some, I am aware, differ in this, and think a tree more liable to winter kill if pruned late, but I have never seen evidence of this, while it does seem that although when pruning is done in autumn, large wounds do not heal so readily, yet they do not decay so quickly as if done in summer. Whenever any wound is made which will not readily heal over the first season, it should at once be covered with grafting wax or some other application which resists moisure. Common paint made of linseed oil and ochre answers well. The neatest application, and the one easiest made, is a solution of gum shellac in alcohol, about the thickness of paint, kept in a well corked bottle. A brush with its handle passing through the cork furnishes the best mode of applying it. It dries almost at once, and if need be, a second covering may be applied in a few minutes.

The following remarks are quoted from Downing's Fruits and Fruit Trees of America, a work, which ever since its publication, has been considered high authority :

" Pruning has the power of increasing the vigor of a tree in two ways. If we assume that a certain amount of nourishment is supplied by the roots to all the branches and buds of a tree, by cutting off a part of the branches, at the proper season, we direct the whole supply of nourishment to the remaining portion, which will, consequently, grow with greater luxuriance. Again, when a tree becomes stunted or enfeebled in its growth, the thinness of its inner bark, with its consequent small sap vessels, (which it must be remembered are the principal channels for the passage of the ascending supply of food,) renders the upward and downward circulation tardy, and the growth is small. By heading back or pruning judiciously, all the force of the nourishing fluid is thrown into a smaller number of buds, which make new and luxuriant shoots and larger sap vessels, which afford a ready passage to the fluids, and the tree with these renewed energies will continue in vigor for a long time.

This treatment is especially valuable in the case of small trees of feeble or stunted growth, which are frequently cut back to a single bud, and a new shoot or shoots, full of vigor, gives a healthy habit to the tree. In the nurseries, this practice of heading down unthrifty trees is frequently pursued, and small orchard trees which have become enfeebled may be treated in the same manner; cutting back the head as far as the place where it is wished that new shoots should spring out. *Older trees should be headed back more sparingly,* and their roots should at the same time be assisted by manure.

A judicious pruning to modify the form of our standard trees is nearly all that is required in ordinary practice. All pruning of large branches in healthy trees should be avoided by examining them every season and taking out superfluous shoots while small. Mr. Coxe, the best American author on fruit trees, remarks very truly, "When orchard trees are much pruned, they are apt to throw out numerous [superfluous] suckers from the boughs in the following summer; these should be rubbed off when they first appear, or they may be easily broken off while young and brittle—cutting is apt to increase their number.

When pruning is not required to renovate the vigor of an enfeebled tree, or to regulate its shape—in other words, in the case of a healthy tree which we wish to retain in a state of the greatest luxuriance, health, and vigor, it may be considered *worse than useless.* Bearing in mind that growth is always corresponding to the action of the leaves and branches, if these are in due proportion, and in perfect health, the knife will always be found rather detrimental to luxuriance and constitutional vigor than beneficial. The best season for pruning to promote growth, theoretically, is in autumn soon after the fall of the leaf. Next to this, winter pruning, performed in mild weather, is best, and in orchards this is the season usually most convenient. We should especially avoid pruning at that period in spring when the buds are swelling, and the sap is in full flow, as the loss of sap by bleeding is very injurious to most trees, and in some, brings on a serious and incurable canker in the limbs.

There are advantages and disadvantages attending all seasons of pruning, but our own experience has led us to believe that, practically, *a fortnight before midsummer is the best season, on the whole, for pruning in the Northern and Middle States.* Wounds made at this season heal over freely and rapidly; it is the most favorable time to judge of the shape and balance of the head, and to see at a glance which branches require removal; and all the stock of organizable matter in the tree is directed to the branches that remain."

THE APPLE.

There is little need of extended observations concerning the value and uses of this fruit. As Downing justly remarks, "The apple is the world-renowned fruit of temperate climates." No other fruit is of so universal use or so generally esteemed, and by means of the different varieties it may be enjoyed in perfection throughout the whole year.

Besides its value as a wholesome and grateful dessert fruit, it is still more so for the kitchen. This is very generally acknowledged, and yet, strange to say, and very strange it is too, that although there is quite as much preference in varieties for the latter use as for the former, many persons deem any wilding or natural fruit good enough for cooking. On no point is reform more needed than this. For pies, tarts, sauce, puddings, preserve or jelly; or for drying, or for cider, good fruit is as greatly to be prefered as for the dessert; and choice varieties are just as easily grown as worthless ones.

Another use for which sweet apples may be extensively grown is for feeding to cattle and swine. We have known whole orchards set out for this purpose. It is true the hogs get few of the apples, for none of the orchards were so extensive as to yield much more than found a still more profitable market. J. J. Thomas, author of American Fruit Culturist, remarks: "Its great value and cheapness as food for domestic animals is very imperfectly understood or appreciated. Take, for example, a brief estimate. Where land is worth fifty dollars per acre, forty good productive apple trees may be planted on an acre and brought into bearing for fifty dollars more, making a hundred in all. These will yield, as an average, four hundred bushels annually, or ten bushels per tree if the best cultivation is given. The annual interest on the orchard at six per cent. is six dollars; the annual cultivation will not exceed six more, or twelve dollars as the cost of the whole crop on the trees, or three cents per bushel. The value of sweet apples for cattle and swine has proved to be fully equal to the best root crops. No land owner need therefore fear to plant extensively with a view of being furnished with a copious supply of food for domestic animals, needing not, like other crops, the yearly attention and care of procuring seed and planting."

Obstacles. It may be well here to refer to some of the hindrances to successful culture, among which the ravages of insects hold a prominent place.

The *Apple Worm*, or codling moth—the *Carpocapsa Pomonella* of entomologists—seems on the increase, and in some sections is very troublesome. The perfect insect is a small and very pretty moth, which flies mostly by night and lays its eggs in the blossom end of the young fruit, where it hatches, and the worm burrows to the core, causing the fruit to fall prematurely. The worm then leaves the fruit and selects some crevice in the bark or other place about the tree, where it spins its cocoon, from which the moth usually emerges the next spring. Some of the earlier ones are said to come out the same season. If practicable to allow swine and poultry to run in the orchard, these worms will mostly be destroyed. Many can be caught by placing old cloths in the forks of the tree, in which the worms will collect. Open mouthed bottles filled with a mixture of molasses and water with a little vinegar, hung near the trees will attract multitudes of the moths. For this purpose June or July are the best months. Any method which will dispose of the damaged fruit as soon as it falls, will be found the most effectual means of getting rid of this pest. Removing all rough bark from the stem and limbs, and thus keeping it smooth, deprives them of their favorite lodging places, and so assists in keeping rid of them.

Bark Lice. In some situations, and some kinds much more than others, apple trees are subject to serious injury from a species of *coccus*. The limbs and twigs are sometimes so covered as to give an almost wrinkled look to them. The little oval shells, resembling half a grain of flax seed, are the deposits of eggs, usually thirty or forty in each. The insect itself is very small, and looks at first like a speck of bluish mould. They begin to hatch about the twenty-fifth of May and finish about the tenth of June. They are active only a short time, but they do a good deal of mischief in a little while, for we find the tree stunted in its growth, and its juices apparently poisoned, for the young wood beneath them, upon being cut into, is found stained. It is important to exterminate them while the tree is young, or upon their first appearance, as they multiply with great rapidity and are soon where it is difficult to reach them. If *applied in June*, I have found no difficulty in destroying them by applying whale oil soap dissolved in water, a pound to a gallon ; but at any other season they resist obstinately. Dr. Fitch recommends boiling leaf tobacco in lye until reduced to a pulp, and mixing soap until of the consistency of paint. At the West, tar and linseed oil has been recommended. But the only reliable method is to attack them at the proper time, i. e., just after the eggs hatch, and then I have no doubt that even common soft soap and water would be effectual. It would appear that in other sections it is a worse evil than here. Dr. Fitch, of New York, says : "The bark louse is, on the whole, the most pernicious and destructive to the apple tree of any insect in our country. Everywhere in the Northern States it infests the orchards to a grievous extent, causing the death of many trees and impairing the health and vigor of many more. * * * Badly as this insect is infesting our orchards in the State of New York, it is scourging our Western neighbors far more severely. In those districts bordering on Lake Michigan, in particular, it is at the present time making most appalling havoc, surpassing anything hitherto recorded of this species. Scarcely a tree is free from them, and unless measures for destroying the insect are resorted to the tree is sure to perish within a few years after it is invaded."

The *tent caterpillar* has been very troublesome for a year or two past. The eggs are contained in cylindrical clusters, which encircle the smaller twigs and contain several hundred eggs. These clusters are covered with a tough leathery varnished covering which protects them from the weather. They may be easily removed by cutting off the twigs ; or *as soon* as they are hatched in spring they may be brushed off, or destroyed, by soap suds or lime wash applied with a swab on a pole. If neglected they grow rapidly, and strip the leaves and thus seriously check growth.

The Borer (*Saperda bivittata*) is the most destructive insect we have to contend with and this, by a little pains-taking *at the proper time*, may be eradicated, or prevented by precautionary measures. In my last report is an article by Mr. Currier, pages 25, 26, in which this insect and the remedies are so ably treated as to leave little to say. I will add, however, that contrary to the common impression, the eggs are sometimes laid at several feet from the ground and not always near the ground. In an orchard near Bangor I saw a tree the past summer on which, in a space of a few inches, near where its largest branches started from the stem, not less than twenty of these little grubs were found from eggs laid the season previous.

Dr. Fitch says, "A person visiting me a few months since remarked that he would himself be willing to pay me a hundred dollars if, by my researches, I would discover some effectual method of protecting apple trees from the borer. Without claiming the reward offered, I informed him I had already experimented and would give him the very remedy he wished; if he would rub the bark of his trees with soap the latter part of May each year I would guarantee that not one of these borers would ever touch them."

Harris says, "The trees and shrubs principally attacked by this borer are the apple, the quince, mountain ash, hawthorn, and other thorns, and the Juneberry or shadbush. Our native thorns and Aronias are its natural food; for I have discovered the larvæ in the stems of these shrubs and have repeatedly found the beetles upon them eating the leaves in June and July. It is in these months that the eggs are deposited, being laid upon the bark, near the root, during the night."

Renovation of Injured Trees.

The winter of 1856–7 was more injurious in its effects upon trees in Maine than any other for a generation past. Not only were fruit trees damaged extensively, but I have seen in various parts of the State, beeches, maples, oaks and elms, which were killed outright. Many fruit trees which survived the first shock succumbed in the course of two or three winters following. Some yet survive, and are mere cumberers of the ground. Let such be cut down, burnt, and the ashes given to new orchards; for the ashes of the apple tree furnish *precisely the inorganic matter* which living apple trees need to appropriate to build up their own structures. Many others not only survive but seem to be gaining strength and vigor. It is an important question what shall be done to assist them?

A question of the circular before referred to was directed to this point, and the replies are in nearly all cases substantially the same, or very similar. One says, "Remove decayed wood, and suckers, *except such as are wanted to form a new top.* Shoal plowing, with moderate dressings, annually or biennially, of compost made of two parts muck and one part barn manure. Ashes, lime and superphosphate are often used to great advantage. Pasturing the orchard with sheep has been of signal benefit in my experience."

Another says, "Plow shoal, trim the dead limbs off, shorten in the live ones, scrape and wash with soap suds or some other alkaline wash, dig around the trees three or four times a year, and be sure to apply some good compost manure, and one calculated to be an amendment to the soil. Old trees bearing poor fruit, yet with sound trunks, may be grafted as soon as you get new shoots of proper size. To renovate neglected orchards requires good attention and skilful cultivation, in order to be a profitable operation. The ground ought to be cultivated and manured but not cropped with anything but apples."

A third says, "Prune, cultivate, mulch and manure."

A fourth gives judicious directions rather more in detail:

"In regard to the question of the best mode for reviving old decaying orchards, from what little experience I have had, would recommend shoal plowing, with care not to bark the roots nor bruise the bodies of the trees, and with a hoe remove the sward from the body of the tree. Then harrow and level off the furrows as well as may be, and then mulch the ground all over a few inches thick with wet strawy manure, swamp muck, or with partially rotted forest leaves. The last named is rather to be preferred as it obstructs the grass from growing more than the others and keeps the ground moister—a very important consideration—by reason of the leaves lying closer to it. Remove all the dead limbs from the tree and crop off some of the outer branches or extremities of the live limbs. Sow no grass nor any other small seeds on the ground, nor suffer any live animal to run in the orchard, and by this means, if the trees have not suffered by having their large limbs cut off at the body, thus producting decay of the tree, they will soon show a vigor of growth and yield of fruit that will richly repay the husbandman for all his labor and care.

"I find no difficulty in raising pears any more than in raising apples, but I find a pear or an apple tree will no better flourish in a state of utter neglect than a hill of corn, except that the tree is somewhat more hardy in its nature than a stalk of corn; and I would as soon plant corn in an old, worn-out mowing field, as to set it out to an orchard, and leave it without any other attention except to see it die."

The replies received which differ materially from the above are as follows:

One says, "To renovate a decayed orchard, I would cut out all decayed wood, fence it well, then turn in as many hogs as could well live in it. If kept short through the summer they will work over the surface pretty throughly. Top dress occasionally with chip manure, &c. Orchards plowed and cropped every season are likely to decay." (Is this so, unless an unripe growth of wood is caused by over manuring?)

Another says, "Scrape off moss and decayed bark. Manure as much as possible with animal manure, fish, flesh and bone dust, either put under the sod, disturbing the roots as little as possible, or covered with muck if more convenient."

Fish and flesh are doubtless good applications for old orchards, *to a moderate extent.*

A fourth writes as follows: "When I first read over your circular, I thought my experience in *fruit culture,* or rather *orcharding,* was so limited that I had nothing worthy to offer, but on a reperusal the other evening it occurred that I might give my experience as a suggestion on the *renovation* of old orchards. The method was accidental rather than theoretical, in the beginning, but it works so well that now I practice it myself and recommend it to others.

"When the limbs of a tree begin to decay seriously, I let it alone entirely, and it soon throws out shoots along the base of the limbs. These I let grow from three to five years, when I prune, selecting such as are the thriftiest and will make the best top to remain, and cut out the rest, together with the dead wood. In a few years you have a young thrifty top, bearing as well as ever, and the fruit is improved in size as compared with the old tree. I have a pear tree, a very fine seedling, that has renewed itself in this way the second time and the twigs are now bending under their load."

A fifth writes—"Where trees show strong symptoms of constitutional disease and decay, cut them down and cultivate the ground thoroughly for at least two years and transplant young trees.

There is no difficulty in raising a tree on the same spot if the ground has been carefully cultivated and well manured previously. If an orchard has been subject to the plow in previous years, plow again and cultivate with root crops of some kind. If the ground be naturally heavy, turn the furrows towards the tree so as to form a dead furrow between the rows. Clean the bark, cut out dead limbs, and wait patiently for new branches to grow. The main point is so to cultivate as to produce new wood for a series of years. Still, in a majority of cases, planting young trees between the old ones is preferable, for the young tree will be old enough to bear with profit as soon as an old tree will be renovated for the same purpose. A judicious combination of the two methods may be the best in many cases."

In connection with the opinion last quoted, I would remark that the principle upon which the practice of *rotation* is based, viz., that any crop cultivated for a succession of years upon the same spot tends to exhaust the soil of those mineral elements which that crop specially requires, is believed to hold good in regard to trees. In the operations of nature, when one growth of trees is cut down or destroyed by fire, not the same, but a different class of trees takes its place; and the policy of planting new orchards on the site of old ones is deemed to be of doubtful expediency. It is true that, with good culture of the ground, young trees will grow pretty well for a series of years. But during thirty, fifty or more years previous a severe draft was made upon the soil for those mineral ingredients which go to made up the inorganic portion of the tree and for the leaves which have been annually shed by it, to say nothing of the fruit also; and whether such an orchard can be as productive and profitable as if planted on soil previously devoted to other uses, is so far from being certain or probable that I would greatly prefer another location, if a suitable one exists on the farm.

Selection of Varieties.

No one cause has produced more disappointment in orcharding than the planting out of varieties too tender for our climate. Many persons, on beginning an orchard, have procured sorts which they know to be satisfactory elsewhere, thoughtlessly supposing that a fruit good in one place is alike good in other places. While some thus selected have succeeded well, others have not. As instances in point, we may mention the Baldwin apple and the Bartlett pear. The Baldwin is most at home in Massachusetts, where it has scarce a fault as a late keeping profitable market apple; but here it is not so hardy, and succeeds only in favorable situations, or when grown by being grafted into the limbs of hardy, well-grown trees. Out of the hundreds of thousands of young trees of this variety, budded or grafted in the nursery, which have been planted out in Maine during the past twenty years, scarcely one in ten, probably even a less proportion, is now in a sound, healthy condition, and by far the greater number have been killed outright; yet it would seem we are slow to profit by experience; for at the present time there are few persons proposing to plant trees who do not call for nursery grown Baldwins. Three winters out of four, these may escape serious injury, but this is not enough. To be satisfactory they should do this in twenty-four out of twenty-five years. So, too, with pears, we have followed too blindly in the lead of cultivators in other States, and the Bartlett has been more sought for and planted than any other. This is described in nearly all books on fruit culture as a hardy variety, and so it is where the writers had seen it; but except under very favorable circumstances, as in city gardens or other warm, well sheltered spots, with a dry subsoil too, it is quite unreliable in Maine.

If we would have fruit in abundance we must be content to learn what kinds are hardy and otherwise suited to our wants, and confine extensive culture to these. We may and ought to try on a limited scale such as give promise of excellence, as among them, doubtless, some prizes will be found, and in this way we may extend our lists until they embrace as great a variety as can be desired.

From the nature of the case, it is impossible for any one to give a list of fruits equally adapted to the different sections even of a single State. The orchardist may learn a great deal from a critical examination of the successes and failures of others in his immediate vicinity. It is not necessary that these neighbors be scientific culturists in order to give valuable testimony. What is most needed are facts, and in gathering these we should note carefully, not only what varieties succeed or fail, but also the kind of soil, the exposure, the shelter, the culture, and as far as may be, all the conditions, which, not less than the inherent qualities of any variety itself, tend to bring about the result.

Some kinds of fruits are pretty uniformly good in a variety of soils and amid other differing conditions. Other kinds depend for a profitable degree of success upon the existence of some one condition, or of several conditions, which are not essential to others.

To illustrate the influence of one of these conditions, viz., the character of the soil, let me state a fact observed in Kennebec county. Extending from the town of Monmouth, through Winthrop and Sidney to West Waterville, there is a formation of pyritiferous slate. In places, the rock is so strongly impregnated with sulphuret of iron, that copperas has been made from it. The soil, of course, partakes of the nature of the rock, which, it may be observed, decomposes more rapidly than many others. This ridge of land is remarkable for the ease and abundance with which the Roxbury Russet apple is grown upon it, and also for the size, fairness and excellence of the fruit. I was informed that although the trees were not often overloaded, they bore well and regularly, every year, so that, taking a series of years, more bushels were obtained of this Russet, than could be from the Baldwin or from any other sort. Large orchards are there to be found consisting almost entirely of this variety, which, as may well be supposed under the circumstances, is found to be the most profitable for extensive culture.

On either side, and even within a short distance of this ridge overlying the copperas rock, it is not so, and other varieties are more productive and profitable than the Russet. Cases so clearly marked, and distinctly defined, as the above, are not frequent, but something like it is by no means uncommon in many sections, and a study of the facts, in any given location, before deciding what sorts to grow most extensively, will be likely to lead to important and valuable results.

The circular before referred to, as having been sent to orchardists in various parts of the State, contained several inquiries as to the best apples for quality and for profit. In response to one as to the two best summer or early apples, Bell's Early was recommended by the largest number. This is doubtless owing in part to the fact that it has been more widely disseminated than any other as good. Next to this, and with nearly as many voices for them, are the Red Astrachan and Early Sweet Bough, each having an equal number, and Williams' Favorite had nearly as many. Next to this, Early Harvest, then High Top Sweet, and then a few for Summer

Sweet and August Sweet, intended probably either for Early Bough or High Top Sweet. Two mention Moses Wood, and one each, Barn Apple, (probably Early Harvest,) Summer Queen and River.

For autumn apples, the largest number recommend the Porter, with nearly as many for Gravenstein, about half as many for Winthrop Greening, (some calling it Lincoln Pippin, and most of them from Kennebec county). Next to this, Jewett's Red or Nodhead, then Hubbardston Nonsuch and Duchess of Oldenburg; one or two each for Fall Greening, Jersey Greening, Fall Baldwin, (meaning Kilham Hill,) Red Pearmain, Garden Royal, Aunt Hannah, Eaton's Seedling, Dean or Nine Ounce apple, Somerset, and Gloria Mundi, wrongly so called, the apple meant being a rich, sweet yellow fruit, extensively grown in Androscoggin county and popular in Lewiston market.

For the best winter, twelve named the Baldwin; eleven the Rhode Island Greening; nine, Hubbardston Nonsuch; six, Jewett's Red; five, Bellflower; four, each, Roxbury Russet and Minister; three, each, Golden Russet, Northern Spy and Ribston Pippin, with one or two each for Nonsuch, (Old Nonsuch or Canada Red,) American Golden Russet, Golden Pearmain (?), Blue Pearmain, Black Oxford, Spitzenburg.

For the best winter Sweet, Tolman's had a large majority and Danvers came next, few others being named at all.

For the three named as worthy extensive cultivation for profit, Baldwin, Greening and Hubbardston Nonsuch had the largest number; then others in the following order: Bell's Early, Gravenstein, Minister, Jewett's Red, Roxbury Russet, and Black Oxford, with one or two each for Williams', Red Astrachan, Sweet Bough, Porter, Blue Pearmain, Gloria Mundi, (the sweet apple before alluded to, true name unknown,) Porter, Nonsuch, (old,) Runnells', and Golden Russet. The recommendations of early fruits for culture with a view to profit, came chiefly from the neighborhood of good markets, and suggests the remark that they have been altogether too much neglected heretofore, thousands of barrels every year being brought from other States and sold at higher prices than winter apples bring, with all the care required before they go to market. It is true they require rather higher culture, but they pay well for it, if the market is large enough, and not too distant.

For the best single variety for profit, Baldwin had the most votes, then others in the following order: Hubbardston Nonsuch, Jewett's Red, Bell's Early, Williams', Red Astrachan, Roxbury Russet.

The replies received were not so numerous as was anticipated, and not all which came, were from persons in possession of extensive collections, which may account for the fact that so few of what may be deemed the newer varieties were even mentioned.

It is gratifying to learn that the Baldwin has so well withstood, or recovered from, the effects of the severe winters a few years ago. It is almost exclusively grown by grafting into limbs, and by this method proves hardy enough to command much confidence as a profitable variety for extensive culture.

Descriptive List of Apples.

The varieties described below are some of those which are believed to have been sufficiently tested to enable us to speak of them with comparative confidence. By far the greater number of those known to be cultivated in the State, or even of those which have fruited on our own grounds, are purposely omitted; and this for a variety of reasons. Concerning some we have contradictory testimony from cultivators in different sections, and sometimes, too, from those even on adjacent farms. Tastes differ also, as well as fruits, or opinions regarding them. We have known one cultivator to procure scions for grafting, from the limbs cut off by another as unworthy of cultivation. Concerning a portion we have too limited a knowledge, others are open to the objection of succeeding much better in some localities than in others; some are known to be uncertain bearers, or variable in quality, and of others still the omission is justified by seemingly sufficient reasons.

The variation, in most fruits, and especially in regard to quality, which is due to soil, season, culture, health and vigor of the tree, and other causes, is such that it is really no easy matter to do full justice in each case; and descriptions should be relied upon chiefly to give a general idea of size, color, form, and other characteristics, rather than minute accuracy in all respects.

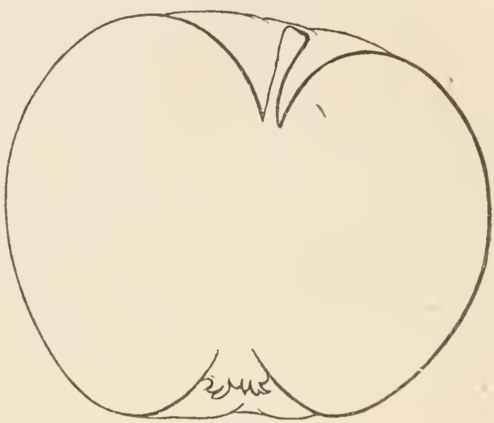
Many of the illustrations, both of apples and pears, are borrowed from Hovey's Magazine of Horticulture, an excellent monthly periodical published in Boston, and largely devoted to fruit culture, and they are believed to be more than usually accurate in delineation.

American Summer Pearmain. This apple though but little disseminated in this State, has, I believe, wherever tried, proved to be of the finest quality. Medium size, rather oblong, skin smooth, yellow, mostly covered with red; flesh remarkably tender, juicy and very rich, excellent for the dessert and good for all uses. The tree is a slow grower in the nursery, but makes a very handsome and hardy tree in the orchard. Productive; begins to ripen about the middle of September and lasts a month or more.

Aunt Hannah. A golden yellow apple, sprinkled with dots, sometimes a little russeted. Of medium size, nearly globular, a little flattened. Flesh yellow, fine grained, crisp, juicy, and of a rich, peculiar flavor. It succeeds well as a nursery tree, growth moderate. Tree hardy. Season, December to February. Originated on the farm of Hannah Perkins, Topsfield, Mass.

Autumn Strawberry—*Late Strawberry.* One of the finest flavored autumn apples in cultivation; has few equals. Fruit of medium size, slightly conical and faintly ribbed, the surface mostly covered with small broken streaks of bright red. Stalk slender, nearly an inch long. Flesh yellowish, very tender, and juicy, rich, subacid, excellent. Tree very hardy, grows freely in the nursery and pretty well in the orchard, but does not attain great size. A good and regular bearer. End of September and October. It is called "late" in distinction from the Early Strawberry, which is a fine fruit, but too tender to succeed here.

Baldwin. A native of Massachusetts, too well known to need description. As an orchard tree, with the exception of hardiness, it possesses nearly all the requisites to constitute it the most profitable fruit to grow extensively for market: great productiveness, good size, color, quality, and keeping well into spring without extra care; and it is hardy enough to succeed generally in favorable situations *if grafted into the limbs of grown trees, but as a nursery tree it is not to be relied upon.* Mr. S. N. Taber, for many years a nurseryman in Kennebec county, and whose opportunities for observation in all parts of the State have since been very extensive, writes, "The Baldwin is only safe when grafted into bearing trees. Have never seen ten profitable trees of this variety in this State which were raised in the nursery." The Baldwin is more extensively grown in this State than any other variety, and it suffered more in the winter of 1856–7 than any other, and somewhat, also, during two hard winters since then. Notwithstanding this injury, however, probably a large majority of farmers in the central and southern parts of the State still rely upon it as their most profitable variety. An apple possessing all the good qualities of the Baldwin, connected with entire hardiness in the tree, in the climate of Maine, is a great desideratum. It is supposed by some that there are several varieties of the Baldwin, but there seems no doubt that the differences which exist, are due to variation in soil or seasons, or from a peculiar influence in some cases from the stock upon which it is grafted.

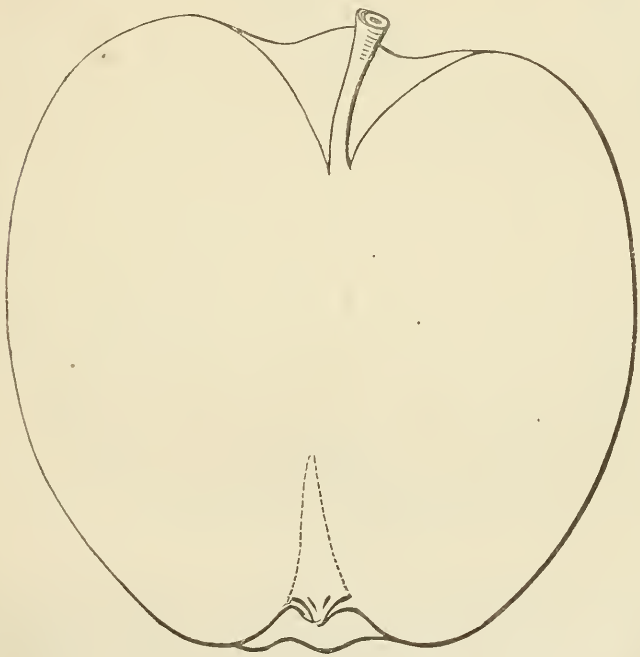


BENONI.

BENONI. One of the best early apples, ripening with the Williams' or soon after, and of decidedly better quality. Medium size, fair, smooth skin, yellow, mostly covered with deep red. Flesh yellowish, fine, crisp, tender, juicy, sprightly and rich. Tree a vigorous, upright grower and bears well, mostly in alternate years.

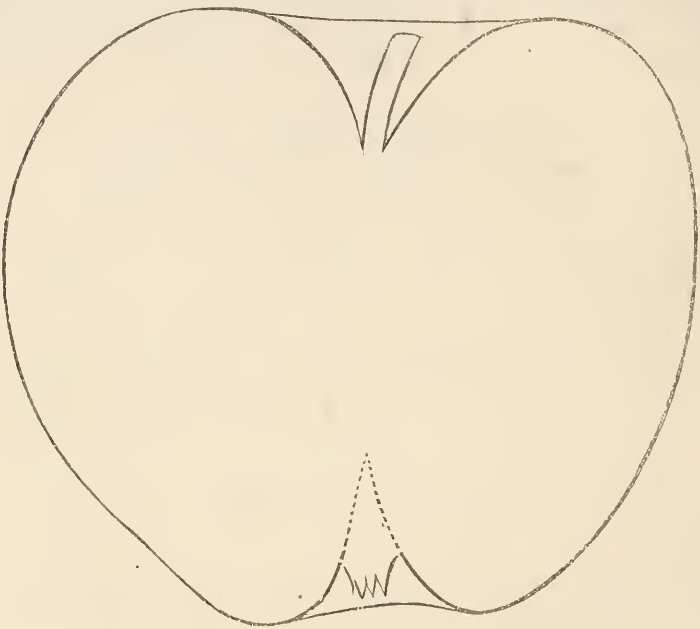
BEN DAVIS. Introduced from Kentucky and but little disseminated as yet. So far as proved, it is of vigorous growth, abundantly productive every year, keeps as late as almost any, and so hardy that scions inserted in the spring of 1856 wholly escaped injury in the following winter, a circumstance true of very few sorts. In size rather above medium, roundish, narrowing a little towards the eye. Skin splashed and striped with red, and bright red next the sun. Flavor good, rather acid. It may be doubtful whether our season be long enough to ripen it fully, but its promise is such as to warrant a fair trial.

BELL'S EARLY. A popular apple in all parts of the State, and grown to a considerable extent under several names. It may be the same as the *Sops of Wine* of Downing and the *Red Shropshire-vine* of Cole. Of medium size, roundish ovate. Skin reddish striped or splashed with dull deep red in the sun. Flesh whitish, sometimes stained with red, tender, subacid, with a very pleasant flavor. Tree very hardy, a rapid grower and good bearer, but not remarkable for longevity. August and September.



BELLFLOWER.

BELLFLOWER, YELLOW. A large, handsome, well known winter apple, of superior quality, oblong, rather irregular, yellow, with a blush cheek next the sun ; the flesh tender, juicy, and crisp, with a sprightly, pleasant acid flavor. The tree is hardy, of vigorous growth, spreading habit, the limbs sometimes bending to the ground with their burden of fruit. In some localities it is very productive and in such it may be planted freely. In others it proves to be a shy bearer. Mr. F. P. Sharp, of Woodstock, N. B., near Houlton, informed me that although the wood was hardy with him, the blossom buds were either winter killed, or so badly injured that it bore nothing, while in Nova Scotia it was a favorite sort for productiveness as well as for quality. It is there known as Bishop's Pippin.



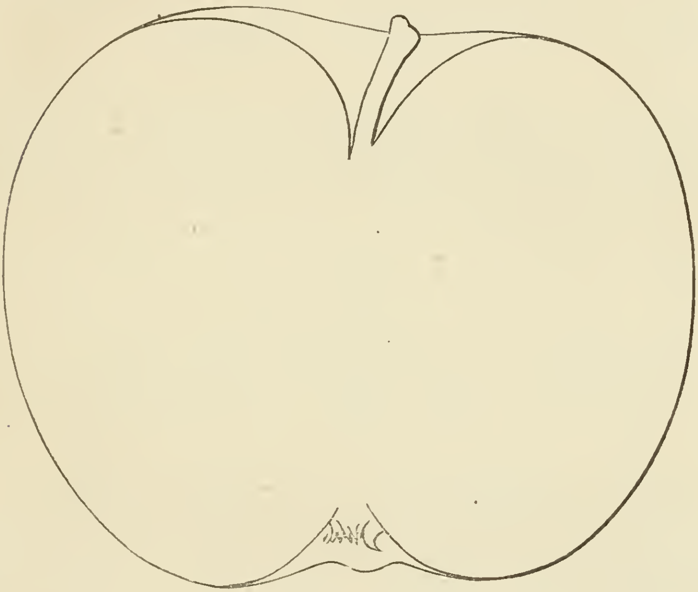
BOUGH.

BOUGH—*Early Sweet Bough—Large Yellow Bough.* A fine early apple, and one of the best of its season. Succeeds well in many parts of the State. Above medium size, sometimes quite large, oblong ovate. Skin pale yellow. Flesh white, tender, juicy, sweet and rich. Tree of moderate vigor and productive. August.

BLAKE. Originated in Westbrook, Cumberland, county. Medium to large. Roundish form, varying somewhat; greenish yellow—

yellow at maturity. Stem three fourths of an inch long, set in a deep russetted cavity, has a few russetted warts. Flesh firm, fine, crisp, juicy, subacid and well flavored; good for cooking or dessert. October to January.

Black Oxford. A medium sized, roundish, deep red apple of very solid texture; mild, subacid, pleasant flavor, and keeping easily into late spring or summer. Though never rich, juicy or tender, its hardiness and productiveness are such that by many it is highly esteemed as a profitable sort to grow for market: with others it is much less valued. February to June.



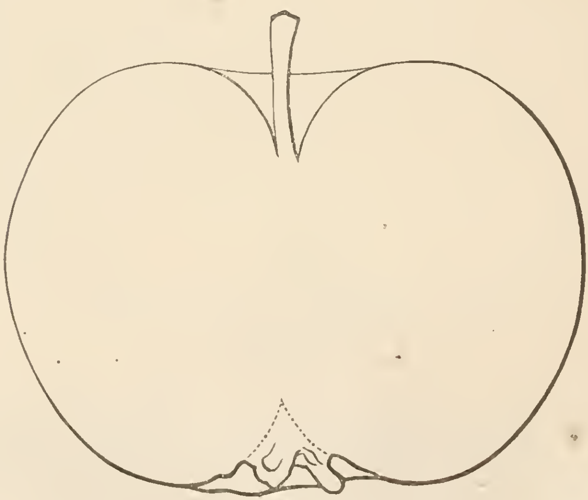
Blue Pearmain.

Blue Pearmain. A well known deep purplish red apple, covered with bloom, in use from December to February. The fruit is not strictly first rate, nor the tree very productive, yet from its great hardiness, its succeding in a diversity of soils and situations where others thrive less, and a frequent habit of bearing most when other apples are scarce, it is often a desirable variety to cultivate.

Briggs' Auburn. Rather large and of flattened form, bright yellow skin, with a little blush. A pleasant subacid fruit which originated in Androscoggin county. The tree is very hardy and productive. September and October.

CATHEAD. By this name is known a popular early autumn apple in Portland market; introduced into the vicinity of North Yarmouth many years ago from New Hampshire, and quite unlike any one described in fruit books under this name. Rather large, oblong, narrowing to the eye, where it is slightly ribbed. Skin yellow, nearly covered with small dots of bright red, intermingled with a few stripes and splashes of the same. Flesh yellowish, sometimes stained with red, and of pleasant flavor. The tree is vigorous, very hardy and productive. September.

CALEF'S SWEET—*Magoun Apple.* Originated on the farm of Robert Calef, Kingston, N. H. Large, yellow, roundish, flattened, with some gray dots and crimson specks. Flesh white, very rich and sweet, of peculiarly fine, delicate texture. November to January.



DUCHESS OF OLDENBURG.

DUCHESS OF OLDENBURG. A Russian fruit of good size, fair quality, great beauty, extremely hardy and immensely productive. Fruit rather large, roundish. Skin pale yellow, finely streaked, and washed with bright red, with a faint bloom over it. Flesh crisp, tender, juicy, with a brisk acid flavor, of tolerable quality for the dessert and excellent for all other uses. September.

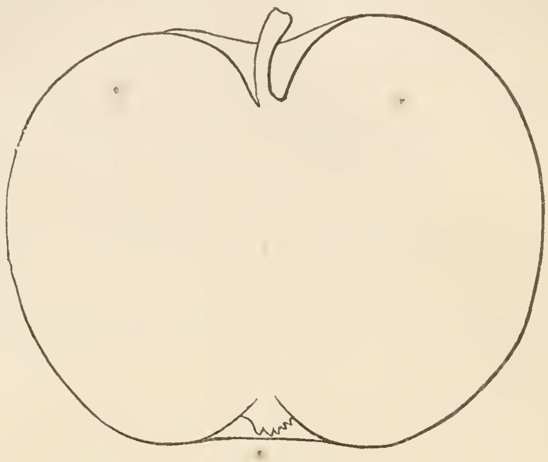
In southern Maine, the Duchess is apt to fall off before ripening, but in this, and in other respects also, it improves as we go north. It is better in Kennebec county than in York, and better in Aroostook than in Kennebec. Its value in the extreme north may be judged of by the experience of Mr. Sharp, of Woodstock, New Brunswick, twelve miles from Houlton, Maine, who informed me that out of four hundred varieties of grafted apples proved by him, rather less than a dozen succeeded, and of these the Duchess stood decidedly at the head of the list. In that vicinity it is known under the name of "The New Brunswicker." The only fault I heard ascribed to it there, was by one who objected to the necessity of building a scaffold about his trees every year—an objection not ill grounded, for unlike other apples, an excessive crop does not prevent this sort from bearing heavily the next year. Such excessive production, however, tells upon the growth of the tree. Where all the strength is given to fruit bearing, we cannot expect much growth of wood, and I do not recollect ever to have seen in Maine or New Brunswick a tree of this variety of large size, unless grafted into a tree already well grown. Had we other varieties combining choice quality and late keeping with the hardiness and half the productiveness of this, our northern counties would have little left to ask for in regard to apple culture.

Danvers Winter Sweet. A choice, late keeping, yellow, sweet apple from Massachusetts, which usually proves one of the best. It is of good size, smooth, fair, bakes well, is in condition for use all winter, and often until April. It succeeds well in the nursery. The tree is a vigorous and rapid grower, hardy and productive.

Domine. Of medium size and flattened form, the skin yellow with stripes and splashes of red in the sun, and is covered with pretty large russet colored specks. Flesh white, tender and juicy, with a sprightly agreeable flavor. February to May.

This fruit has not been much disseminated in this State, but in every instance where I have seen it, has given a high degree of satisfaction. The tree is of rapid growth and very productive, the limbs sometimes bending to the ground with the weight of fruit crowded upon them in continuous clusters. In my orchard it has also proved one of the hardiest, and is deemed worthy of more extended trial.

Early Harvest. When well grown this is the very best early apple we have, so far as quality is concerned. Round, sometimes a

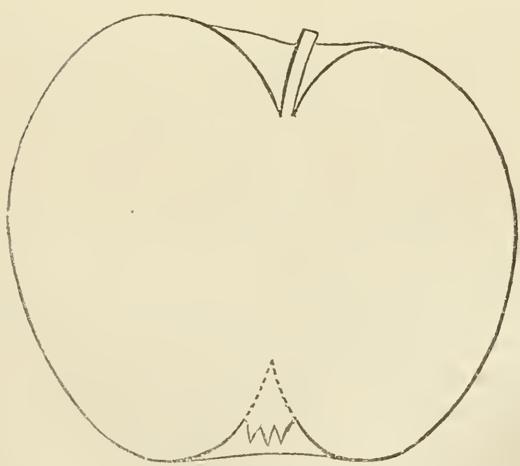


Early Harvest.

little flattened; the skin bright yellow in the sun, pale in the shade, and smooth; flesh white, tender, juicy, and crisp, with a rich subacid flavor. The tree succeeds poorly in the nursery. Although hardy it is not a vigorous grower and requires high cultivation, as without it the fruit is inferior and often imperfect, sometimes spotted or cracked. It is a fruit of which one desires a tree or two for home use, but is not a profitable market variety. End of July and August.

Esopus Spitzenburg. Above medium size, oblong, tapering to the eye, mostly a rich red, with distinct gray specks. Flesh yellow, crisp, of rich flavor and not surpassed in excellence by any other. The tree is not long lived, is rather a feeble and slow grower and less productive here than in New York, whence it was received and where it is extensively cultivated and ranks best. Succeeds best grafted into grown trees. Two or three other apples are grown to some extent under the name of Spitzenburg, which are much inferior in quality to the above.

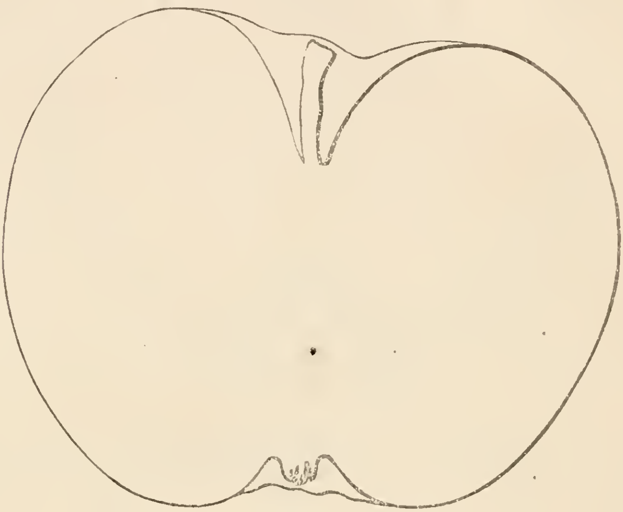
ESOPUS SPITZENBURG.



FAMEUSE.

FAMEUSE—*Snow Apple—Pomne de Niege.* This is probably of

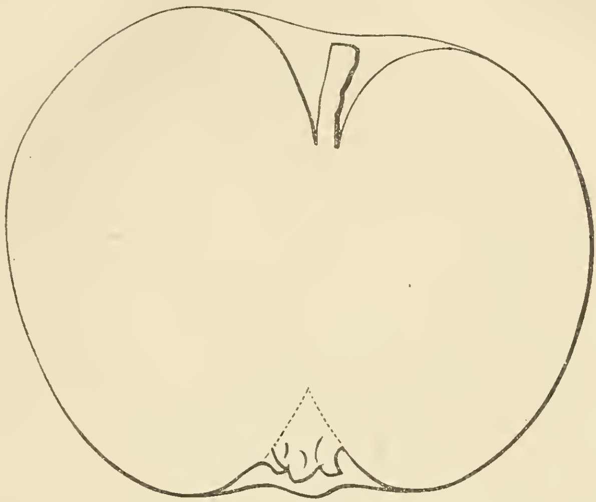
French origin and was carried to Canada at a very early date, from whence we have received it. It occupies the first rank among Canadian apples. Fruit of medium size, or rather less, deep crimson; flesh snowy white, tender, and of delicious flavor. Tree of vigorous growth, succeeds well in the nursery and bears early and abundantly; is adapted to a variety of soils and deserves extensive cultivation in all parts of the State. Is perfectly hardy, even in Aroostook county and in New Brunswick. November to February.



FOUNDLING.

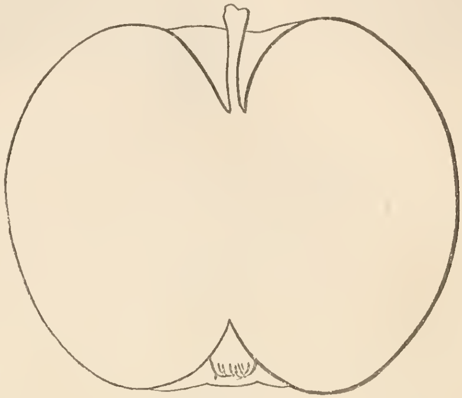
FOUNDLING. Originated in Groton, Mass. The tree is of a spreading habit, hardy, a good grower and regular bearer. Fruit large, ribbed. Skin greenish yellow, striped and shaded with deep red. Flesh yellow, tender, and juicy, with a rich aromatic flavor. One of the best of its season, which is from the end of August to October. Has been grown in the State for twenty years or more, but is not so well known or widely cultivated as it deserves to be.

FALL ORANGE—*Holden Pippin.* Large, roundish, oblong; skin yellow, sometimes a brownish cheek next the sun and sprinkled with dark crimson dots. Stalk very short, inserted in a narrow, deep cavity. Flesh white, very tender, juicy, rather acid for some palates, but of pleasant flavor. Excellent for cooking. A very strong erect grower, hardy and productive. October and November.



GRAVENSTEIN.

GRAVENSTEIN. This apple is more cosmopolitan than any other within my knowledge. That local character which attaches to nearly all varieties of the apple, and by which their desirableness, whether in regard to hardihood, or thrift, or quality, or production, is confined within moderate limits, sometimes to very narrow ones, seems to attach in a very slight degree, if at all, to the Gravenstein. Like the Green Gage among plums, it seems to be at home and to give general satisfaction wherever it is cultivated. It is a native of Germany, and is considered the best of northern Europe, and I know of no section of this country where it does not take a high rank, and by many is esteemed the very best autumn apple. Fruit large, rather flattened and a little angular. Skin yellow, streaked and dashed with bright red and orange. Flesh tender, crisp, very juicy and high flavored. September and October. The tree is of thrifty and vigorous growth, and productive. In regard to hardiness, Mr. A. Cushman, of Golden Ridge, Aroostook county, showed it to me in his orchard as healthy and sound as any. He esteemed this and the Duchess of Oldenburg as the two best for autumn. The only drawback to its value which I am aware of is, that in some situations (perhaps owing to stagnant moisture in the soil or subsoil) it is liable to a malignant, cankery disease which affects the wood, and soon destroys the tree.

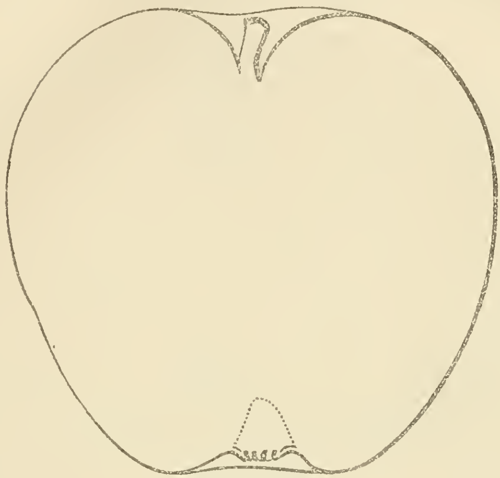


Garden Royal.

Garden Royal. Below medium size; skin greenish russetty yellow, mostly covered with dull crimson and with large light specks upon it. Flesh yellow, very fine and tender; if fully ripened on the tree, almost melting like a peach, with a delicious aromatic flavor. With as good culture as it deserves it bears well, but is a very moderate grower, unless grafted into vigorous trees. Indispensable in a good private collection. Within a few years it has appeared in the markets of Portland in considerable quantities. September.

Garden Sweet. Medium size, slightly oblong; stem, short; skin greenish yellow, with blush next the sun, and dotted with light specks. Flesh yellowish white, juicy, tender, sweet and good flavored. Very hardy, thrifty and productive; succeeds admirably both in the nursery and orchard, in a variety of soils, and in many situations where few others thrive as well. The fruit, too, is uniformly fair and the tree heavily productive, chiefly in alternate years. From the middle of September, it is in use for two months or more; might be grown profitably merely for feeding swine.

Golden Russet—*Bullock's Pippin—American Golden Russet.* There are several "Golden Russets" grown in the State which it is not easy to identify as distinct varieties, though probably two or three may prove to be so, and not merely differing by reason of



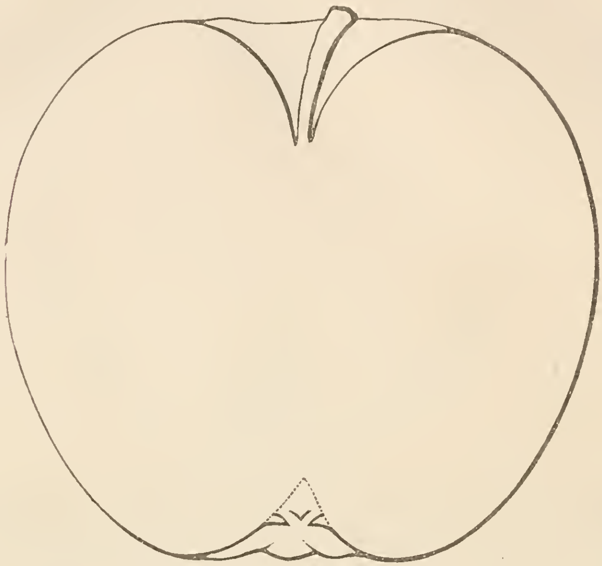
Golden Russet.

soil or location. The trees are usually of fair vigor and productiveness, in favorable situations bearing well. Skin golden russet with a reddish cheek in the sun. Flesh yellowish white and tender, with a mild pleasant flavor. January to May.

Golden Ball. This variety was introduced from Connecticut more than forty years ago. About twenty years ago some parties extolled it highly and it was pretty widely disseminated, but it has not given much satisfaction. It is large, handsome and good, and and the tree hardy and vigorous, but generally a shy bearer and unprofitable.

High-Top Sweet—*Summer Sweet.* An old favorite variety which originated in Plymouth, Mass. The tree is of vigorous, upright growth and productive. I found it hardy, succeeding well as far north as Patten, on the Aroostook road. The fruit is rather below medium size, bright yellow, very sweet, pleasant and rich, almost aromatic. Two or three other apples somewhat resembling it in fruit and growth of tree are grown under the same name. August.

Hubbardston Nonsuch. Origin, Hubbardston, Mass. One of the best and most popular late autumn and early winter apples, and worthy of extensive culture. Fruit of large size, roundish, a little oblong, and slightly narrowed near the eye. Skin yellowish, mostly covered with stripes and splashes of red, and often some-

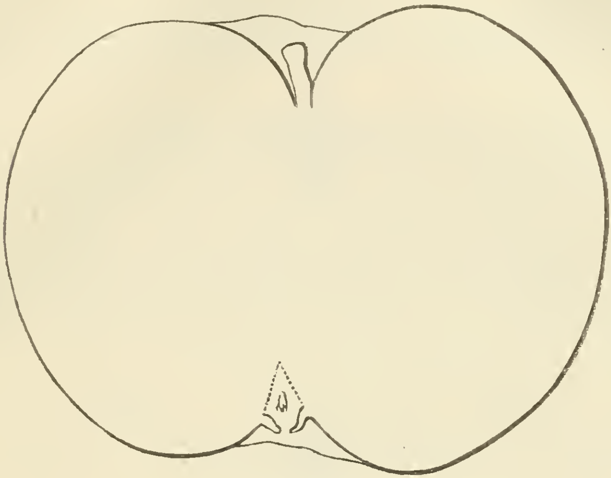


Hubbardston Nonsuch.

what russetty. Flesh yellowish white, juicy and tender, with a mild agreeable flavor, mingling sweetness with acidity. The tree is hardier than the Baldwin, and generally hardy enough; a good grower and very productive. Recommended for extensive cultivation. Mr. Taber says he has sometimes seen thrifty trees killed to the scion, apparently in consequence of being grafted with this sort—an observation I have never known made by others. November to February.

Haskell's Sweet—*Sassafras Sweet.* A rather large, flattish, sweet apple of excellent quality, which originated in Ipswich, Mass. Skin yellowish, with faint blush next the sun. Flesh tender, juicy, sweet and rich. Tree hardy, vigorous and productive; bears young. October.

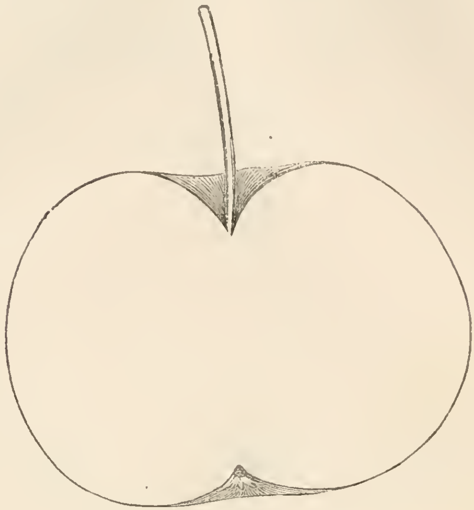
Jewett's Red—*Nodhead.* This apple originated in Hollis, N. H., in which vicinity, as well as in parts of this State, it has been long cultivated under the name of Nodhead. It is one of the best and



Jewett's Red.

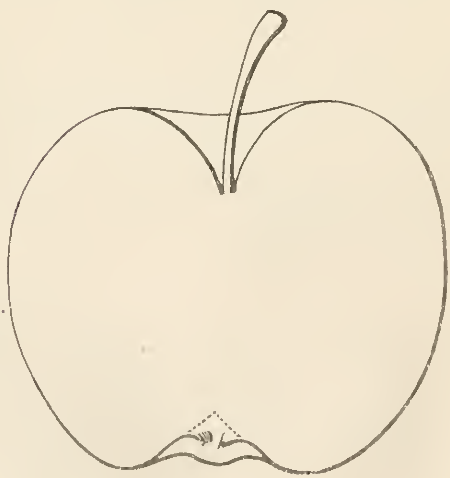
most popular late autumn apples, and may be kept into winter, but with loss of its peculiarly high, rich flavor. The tree is hardy and very productive, and were it not for the extreme tenderness of the skin, rendering it very liable to injury from insects and thus causing a large proportion of the apples to be knobby and unsaleable, it would be one of the most profitable for the market. Medium size, oblate; skin greenish, striped and shaded with crimson. Stem short, set in a small, shallow cavity. Flesh yellowish, very tender, almost melting, with a peculiarly rich, mild, sprightly flavor—requires good cultivation.

Jabe. Originated on the old Perley farm in Boxford, Mass. Medium size, flattened—one of the handsomest of apples. Skin smooth, light straw color, with a beautiful blush cheek, or if not well exposed to the sun, with crimson spots. Stem rather more than an inch long, set in a small, rather deep cavity. Flesh yellowish white, very fine grained, tender, juicy, melting and rich, with a rather peculiar, pleasant, subacid flavor. Thrifty, hardy and a regular and abundant bearer, giving full crops every year. End of September to early in November.



JABE.

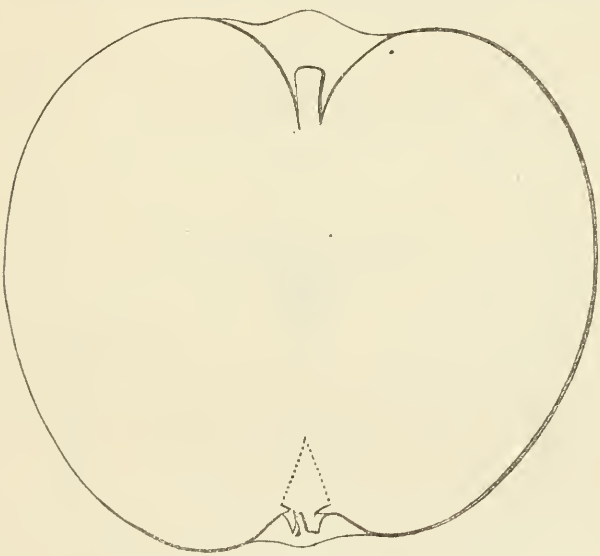
JEFFERIS. Of medium size, flattened form. Skin yellow, splashed and striped with crimson. Flesh white, very tender,



JONATHAN.

crisp, juicy, with a rich, subacid flavor. A fair, handsome apple, ripening in September and October, which originated in Pennsylvania, and has proved of first rate excellence here. The tree is hardy, scions which were received and set in the spring of 1856, having received no injury in the severe winter which followed. Young shoots slender, growth moderate; productive—one of the best of its season.

Jonathan. A medium sized, handsome dessert fruit, introduced to notice by the late Judge Buel. In flavor and excellence, it rivals, and much resembles, the Esopus Spitzenburg. Form, roundish ovate; skin smooth, yellow, deepening to bright red in the sun; flesh tender, juicy and very rich. The tree is hardy, growth moderate, young shoots slender, productive. January to April.

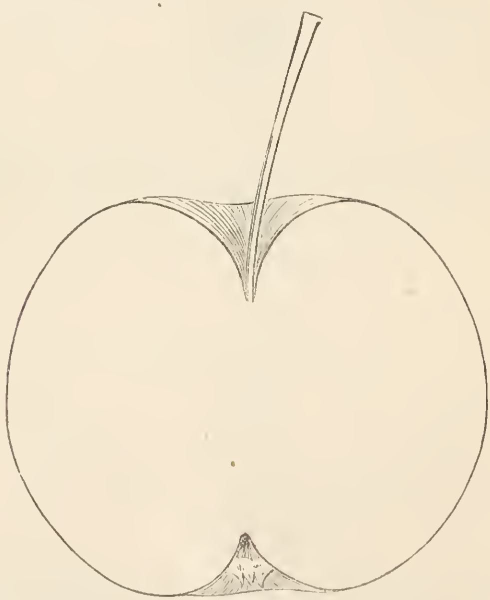


Ladies' Sweeting.

Kilham Hill. Fruit large, ribbed; skin yellow, deepening to dark red in the sun; of good flavor when at its prime, which is about the end of November, but soon becomes dry and mealy. Tree very hardy, vigorous, of irregular, spreading growth and productive. A native of Essex County, Massachusetts. It is considerably grown in some parts of the State, under the name of Fall

Baldwin. It is *not* recommended as worthy of more extensive culture.

Ladies' Sweeting. Of large size, fine form, rich color, very sweet, and keeping late, this variety probably merits a place in every good collection. The tree is not a rapid grower or early bearer, but with age becomes very productive. In some sections, doubts are expressed of its hardiness, but it has proved hardy with me, and in a rather unfavorable situation. Fruit large, roundish, of regular form ; skin fair, smooth, greenish yellow ground, mostly covered with light red and faintly striped with crimson, and dotted with numerous yellow specks ; stem short. Flesh fine, crisp, tender, juicy, sweet and rich. January to April. It is quite distinct from a light colored apple sometimes grown under the same name, and also known as Vaughn's Sweet.

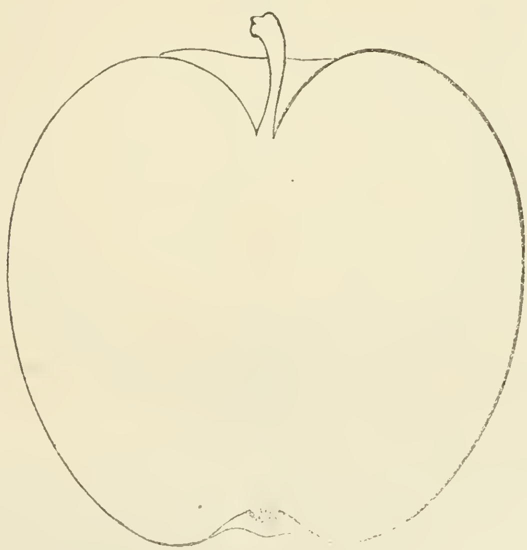


Long Stemmed Sweet.

Long Stemmed Sweet. Originated in Bridgton, Cumberland County. Slightly below medium size, roundish ; skin yellow, covered with small stripes and dots of light red. Stem one and a half to two inches long, inserted in a rather deep and russety cavity. Flesh yellowish, very juicy, melting, rich and very sweet. A vigorous, healthy grower, of remarkably upright habit, and very productive. October.

Mexico. Medium size, roundish; skin mostly bright crimson, sprinkled with light dots. Flesh whitish, sometimes stained with red, tender and excellent. One of the best of its season. September. Tree of moderate growth, hardy and productive. Origin, Canterbury, Conn.

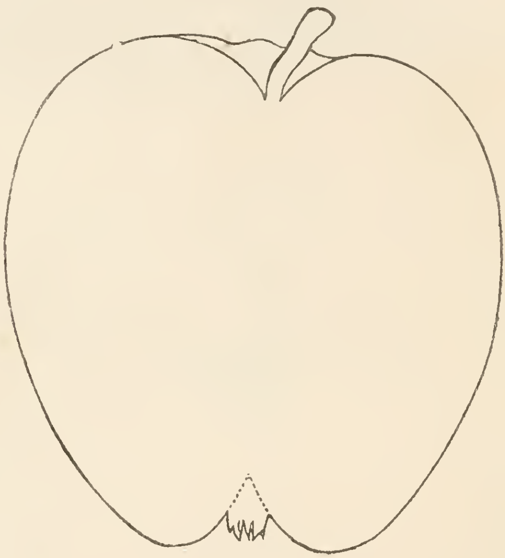
Mother. Fruit of medium size, roundish oval; skin deep yellow, almost covered with brilliant red, interspersed with russetty dots; flesh yellow, fine, crisp, tender, juicy, with a brisk, pleasant,



Mother.

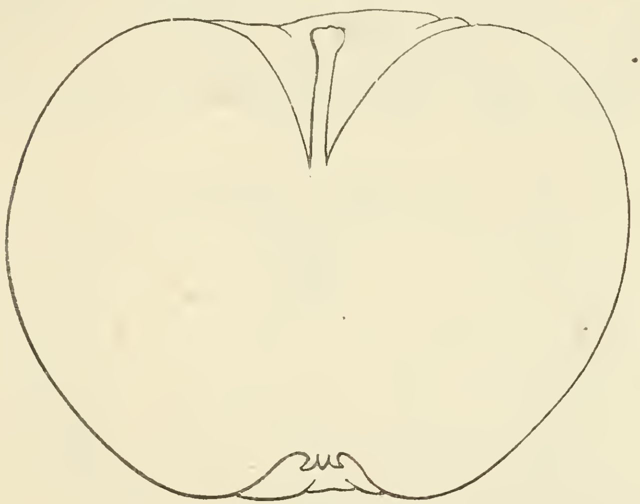
spicy flavor. Tree hardy, of moderate vigor, and in favorable soils productive. Originated on the farm of General Gardner, Bolton, Mass. In Worcester county it is extensively cultivated, and is esteemed among the best. It sustains its reputation here as to quality, but it may be doubted whether it can be grown profitably for market. October to January.

Marshall. Above medium size, roundish, a little flattened; skin deep green, mostly overlaid with a fine thick sprinkling of whitish green specks, a little blush next the sun and some crimson specks; stem short, in a narrow cavity. Little known in this State, but largely grown in some parts of New Hampshire as a profitable market apple on account of its productiveness and very late keeping. Tree very hardy, vigorous, and exceedingly productive. April to July.



Minister.

Minister. The late Robert Manning considered this "one of the very finest apples New England has produced," in which opinion we concur. It originated in Rowley, Mass., and was brought to notice by the late Rev. Dr. Spring of Newburyport, who engaged the fruit from the original tree, and his people seeing it on his table, soon gave it the name by which it has since been known. In the tenderness of its flesh and brisk vinous juice, it is not surpassed by any apple of its season. It is of good size, and though somewhat irregular in form, it has a fair yellowish skin, mostly covered with stripes of bright crimson. The tree succeeds well in the nursery and in the orchard; proves a thrifty, healthy grower and an abundant bearer. Like some other kinds, the fruit from young trees, and especially if the head be crowded, is much inferior to that from trees of mature age and open to the sun and air. Its season is about the same as the Hubbardston Nonsuch, say from November to February, or with care may be kept later. Its brisk, acid, vinous flavor forms a pleasant contrast to the mildness of the Hubbardston, and both are alike heartily commended for extensive cultivation. It often grows much larger than represented by the cut.

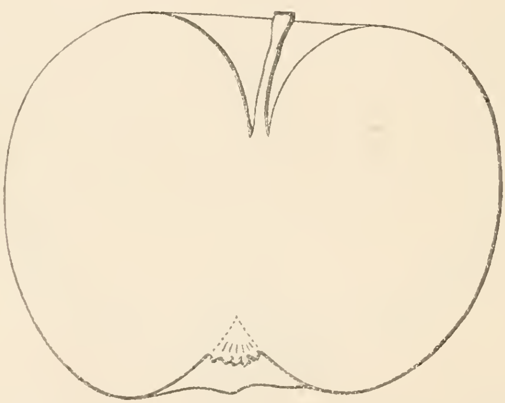


Northern Spy.

Moses Wood. A native of Winthrop, Kennebec county, of medium size, roundish, yellow beautifully striped with bright red. Flesh white, tender, very juicy, of a pleasant, subacid flavor. Vigorous and productive. September. Were there not so many fine apples in eating at the same season, it would deserve distinguished praise.

Northern Sweet. Introduced from Vermont; has succeeded well in Penobscot county and in some other sections of the State. Medium size, roundish; skin of oily smoothness, yellow, with a blush cheek. Flesh white, tender, rich and sweet; tree hardy, and an abundant bearer, mostly in alternate years; needs rich culture. October.

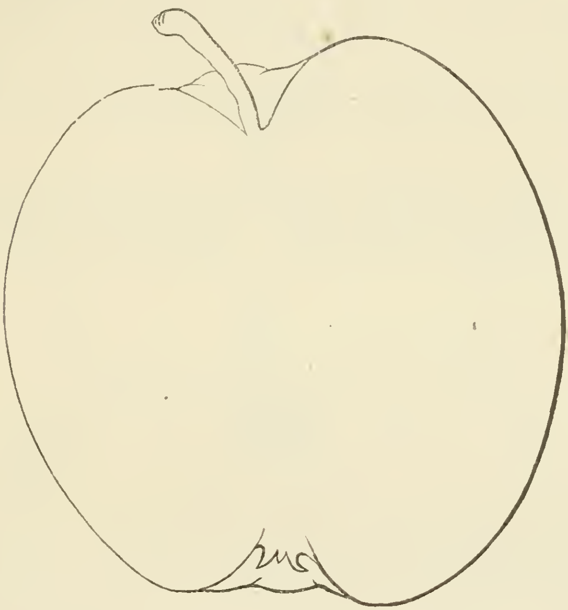
NONSUCH — *Old Nonsuch — Red Canada.* An old variety, formerly much cultivated, and one of the richest and highest flavored apples with which we are acquainted, but it cannot be recommended for general culture. The fruit is often spotted and small, and the tree not very healthy; yet in some sections it is still held in high esteem. A correspondent in Piscataquis county, and one in Penobscot county recommend it as one of the three best winter apples. Fruit of medium size, oblate, slightly angular; skin yellow, mostly shaded or splashed with bright red or crimson, and thickly sprinkled with greyish dots: stalk short, inserted in a broad, deep cavity. Flesh white, tender, crisp, very juicy, with a brisk, delicate flavor, which it keeps to the last. February to May.



POMME GRIS.

NORTHERN SPY. When this was first introduced into Maine from New York, about fifteen years ago, it came with a loud flourish of trumpets, and was widely disseminated within a short time. Its unusual tardiness in coming into bearing disappointed many, and it came near being condemned without fair trial, but latterly it has, so far as I can learn, given satisfaction. The tree is very hardy, of thrifty, upright growth, moderately productive, and needs high culture. The fruit is of the highest excellence, fragrant, delicious, and retains a peculiar freshness, like an autumn apple, into late spring. Fruit of large size, pale yellow in the shade, with stripes of purplish red next the sun; stalk three quarters of an inch long, set in a very wide, deep cavity, marked with russet. Flesh whitish, fine grained, very tender, juicy, mild subacid, with a peculiarly fresh, delicious flavor. Origin, Bloomfield, New York. January to June.

Orange Sweet. The fruit known here under this name, seems to be unlike the Golden or Orange Sweet, described by Kenrick, and the Orange Sweeting of others. It is a valuable fruit, above



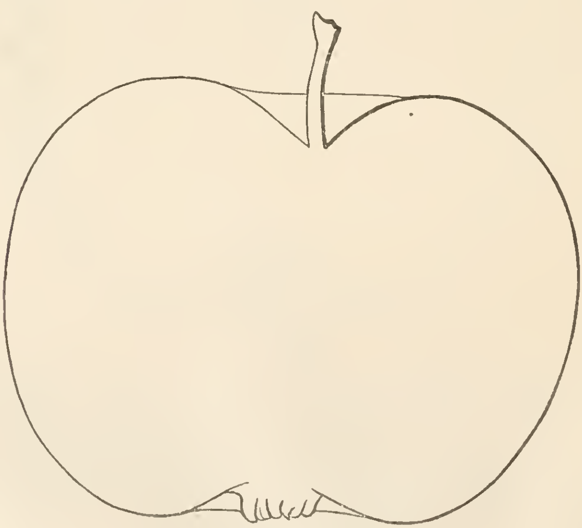
Porter.

medium size, roundish ovate. Skin bright yellow, with a blush cheek in the sun, and sprinkled with small greenish dots, sometimes with larger crimson ones. Flesh yellowish, tender, sweet and rich. The tree is healthy, of thrifty growth, upright habit, and a good bearer. September and October.

Pomme Gris. The most extensively cultivated and popular late keeping apple in Canada. It proves very hardy here, and although small, deserves a place in choice collections from its exquisite flavor. Size below medium, roundish oblate, skin rough, covered with russet, and thickly dotted with grayish russet specks. Flesh yellowish white, crisp, tender, high flavored and excellent. Usually smaller than the specimen from which the drawing was made. December to April.

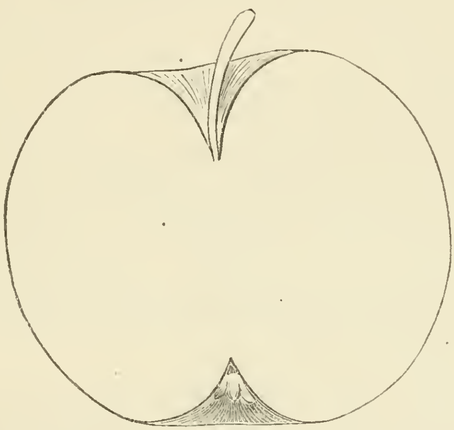
Porter. A deservedly popular autumn apple, ranking among the best. It comes in eating soon after the Williams, and is good for a month. Rather large, oblong; skin fair, smooth, bright yellow, with a little blush on the sunny side. Flesh yellowish, fine, crisp, tender, and juicy—sprightly and good flavored. Tree a moderate grower and productive. Scarcely as good here as in Massachusetts, where it originated, in the town of Sherburne, on the grounds of Rev. Samuel Porter. September and October.

President. A very large, handsome apple—yellow with a blush cheek. Flesh firm, juicy, subacid, and excellent for cooking. Tree thrifty, hardy and productive. September and October.



Red Astrachan.

Red Astrachan. A Swedish or Russian apple of extraordinary beauty, and as hardy as it is beautiful; succeeding in the severest climates where the apple is grown at all. The tree combines thrifty, vigorous growth, productiveness and perfect hardiness. The fruit is good as well as beautiful, though not of the highest excellence, and its season is rather short; if left on the tree too long it becomes mealy; size large, roundish, a little flattened; skin fair, smooth, rich brilliant crimson on the sunny side, a little paler in the shade, and covered with a rich bloom. Flesh white, sometimes stained with pink, fine, crisp, tender, juicy, subacid. Its productiveness, beauty and good quality render it a universal favorite, and a profitable, early market fruit. August and September.



Rock Sweet.

Rock Sweet. Introduced from West Newbury, Mass. Rather below medium size: skin reddish yellow in the shade, but mostly covered with purplish or brownish red, and sprinkled with small light dots, except about an inch around the stem, where it is usually of a cinnamon russet color, and occasionally a small protuberance or patch of the same russet; stem slender, an inch long, inserted in a rather deep cavity. Flesh yellowish, fine grained, juicy, very sweet, with a rich aromatic flavor. No sweet apple surpasses it in quality. Tree very hardy, thrifty, and very productive—young shoots slender. November to December.

Rhode Island Greening. Too well known as one of the best winter apples to need a detailed description. When well grown it is a choice dessert fruit, and it is also one of the best, if not the very best, of cooking apples. The tree is productive and thrifty, making a large spreading head. It is more hardy than the Baldwin, but it has sometimes suffered a little, especially nursery trees, in severe seasons. A very valuable variety, and indispensable in every collection.

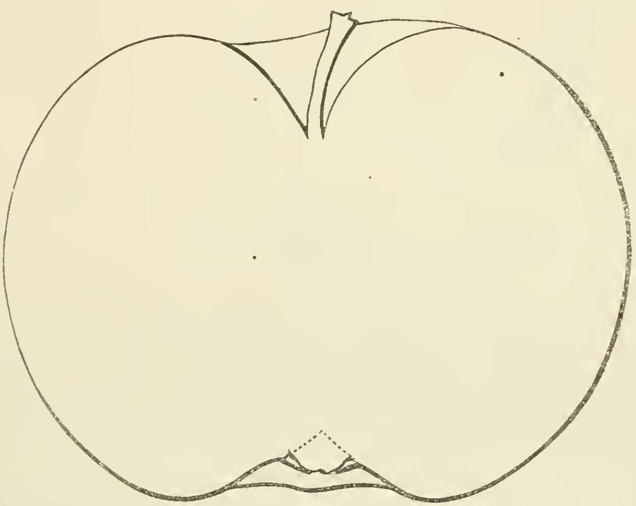
Mr. C. Chamberlain of Foxcroft, one of our most skillful and experienced orchardists, writes me that in Piscataquis county they have a "variety of Greening that for cooking and eating combines more excellences than any other apple in use here. November to February. The tree large and vigorous, and is a good bearer; origin unknown—distinct from R. I. Greening."

Roxbury Russet. A well known apple, valuable for its late keeping qualities. Above medium size, flattened; yellowish russet skin, sometimes with a blush cheek. Flesh greenish white, rather dry, and of fair subacid flavor. Trees grafted in the nursery are tender, and impatient of transplanting; hence it should be cultivated only by grafting into the limbs of grown trees, and in this way it usually proves hardy. In some soils (usually deep and moist ones) it is very productive, and in others much less so. For interesting facts regarding this fruit in Kennebec county, see page 192. Spring and early summer.

Ribston Pippin. Introduced many years ago, by the late Dr. Vaughn of Hallowell, from England, where it is esteemed as the best apple. Above medium size, roundish, a little flattened; skin greenish yellow, streaked and mottled with dull saffron red in the sun, and a little russety withal. Flesh yellow, firm, crisp, juicy, with a peculiarly rich aromatic flavor. In quality it has few equals. Downing remarks that in England no higher praise can be given to an apple than to say it has a Ribston flavor. The tree is hardy, of vigorous growth and spreading habit; in some localities very productive, and in a good many others much less so, for which reason alone it is not recommended for extensive culture. December to May.

Runnells. Medium size; deep green in the shade, but mostly covered with purplish or brownish red; small protruding dots give a rough feel to the skin; stem three-quarters of an inch long, set in a deep, narrow cavity. Flesh very firm, of moderate excellence either for cooking or for dessert. Profitable as a market fruit from its hardiness, great productiveness, and late keeping; is scarcely fit to use before May or June, and will keep until autumn and later.

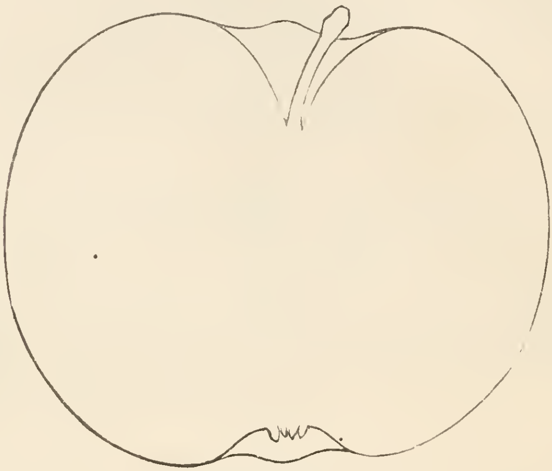
Somerset. Originated in Somerset county. One of the handsomest of apples; large, roundish, somewhat flattened. Skin bright yellow, mostly covered with splashes and stripes of bright crimson; deep red next the sun. Stem an inch long, set in a rather broad and deep cavity. Showy and saleable. Flesh yellowish, sometimes stained a little with red, tender, juicy, and of agreeable subacid flavor. Mr. Taber and others say it is a strong grower, hardy and productive. It has not fruited with me. September.



Smokehouse.

Smokehouse. Recently introduced from Pennsylvania, where it is highly esteemed, and from an experience of seven or eight years, it is recommended as promising to be a valuable variety here. Rather large, flattened form; skin yellow, shaded and splashed with red, with a few grey and brown dots. Stem rather long, and inserted in a broad cavity. Flesh yellowish, somewhat firm, crisp, juicy, with a pleasant acid flavor. Tree of spreading habit, very hardy and productive. Fruit uniformly fair and perfect. November to April.

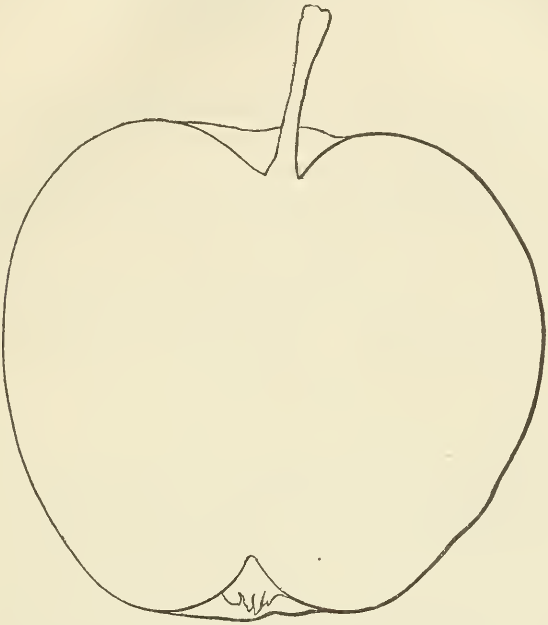
Sweet Golden Russet. Origin unknown. Introduced many years ago from Worcester county, Mass. Medium to large, conical. Skin yellow, mostly covered with light russet; rather juicy, very rich and sweet, hardy and productive. September and October.



Tolman's Sweet.

Tolman's Sweet. Second or third rate as an eating apple, but excellent for baking, and from its productiveness would be profitable to grow largely, even for feeding swine or cattle. The tree is a moderate grower, and very hardy. Fruit of medium size, round. Skin whitish yellow, with a faint blush, often has a distinct line from the stem to the eye. Flesh white, rather firm, fine grained, not very juicy, and sweet—keeps late. November to May. Recommended for extensive cultivation.

Mr. Taber writes me of this, "I have found the tree invariably well formed, long lived, and productive; know no apple which will bear all the vicissitudes of climate better. It is the *only sort which I have even known* among the New York *root grafted* trees which lives to pay cost. In this vicinity it is a leading sort. A neighbor realizes more income from his Tolmans than from all others sent to market. They keep fresh until April. Seems to flourish best on warm soils, but thrives in as many localities as any apple."



WILLIAMS.

WILLIAMS—*Williams' Favorite.* A large, handsome, and very popular market apple, of fair quality, ripening through August and September. Always commands a high price when well grown. Oblong, smooth, red, covered mostly with darker red or deep crimson. Flesh white, sometimes a little stained with red; of mild and agreeable flavor. The tree is very hardy and productive. Needs a strong rich soil. It is a moderate and ill-shaped grower in the nursery, but forms a large tree in the orchard, with a wide spreading top.

WINTHROP GREENING—*Lincoln Pippin* (of some, *erroneously*). A native of Winthrop, and one of the most popular apples in Kennebec county. Fruit large, roundish, flattened, nearly of the form of Smokehouse. Golden yellow, partially russetted, and with a red cheek in the sun. Flesh tender, crisp, juicy, with a rich, sprightly flavor. Good from September to November, and I have seen them in perfect condition in January. In Kennebec county it is often heavily loaded with perfect fruit. In my grounds it has proved less productive, and the fruit is often blown off. Not an early bearer, but a vigorous grower, and becomes a tree of the largest size.

Woods' Sweet. Scions of this very handsome fruit were sent me by Mr. Charles Downing, in the spring of 1856, and survived the severe winter following without injury, thus exhibiting unusual hardiness. It originated in Sudbury, Vermont, and is there considered the finest sweet apple in cultivation. Fruit medium to large, oblate. Skin waxen or oily, light yellow, shaded and striped with fine rich red. Flesh white, tender, juicy and sweet, with a delicate, rich flavor. A good grower, of upright habit and productive; succeeds well in the nursery. September to November.

Crab Apples, *for preserving and ornament.* Among the best of these are the Large Red Siberian, Large Yellow Siberian, the Wax Crab, and the Transcendant. The trees are objects of beauty both when in bloom and when laden with their abundant clusters of golden and crimson fruit. They are extremely hardy and very productive. The fruit of the Cherry Crab is too small for use, but it is as ornamental as any. The Chinese Double Flowering Apple has not proved hardy.

Dwarf Apples.

These have not been much cultivated in Maine. They are of two sorts. Those worked upon the Doucain stock (called Paradise by the English) and those upon the one known by the French as the Paradise stock. Upon the Doucain, which is the hardier of the two, they need from eight to ten feet room and attain a size sufficient to bear a bushel or more of fruit. Upon the Paradise stock they are of smaller growth and may be set at five or six feet apart. With a shortening in of the shoots they may be kept about the size of a stout currant bush, and bear profusely. Neither of them are suitable for ordinary orchard culture, but in the fruit garden are very desirable, being ornamental and yielding much gratification.

Their culture is easy—give a deep rich soil; plant so that the junction between the scion and the stock is *just even with the ground.* If planted deeper the scion may strike root, and the tree grow so vigorously as to lose its distinctive character as a dwarf tree. Keep the head open and thin out the fruit so it may attain its full size. To the extensive orchardist they would seem little else than horticultural toys, but to the occupants of town lots, they are both ornamental and useful, and deserve more general cultivation, especially the choice early sorts, which are rarely plenty in market. What more beautiful to the eye than the apple tree in full bloom, or loaded with its crimson or golden fruit? What more tempting to the appetite than the grateful and palatable fruit itself?

Almost all varieties are grown on these stocks, but mostly the handsome early and showy autumn sorts. Red Astrachan and Duchess of Oldenburg are special favorites.

THE PEAR.

The pear is a most delicious and estimable fruit and its culture is worthy of more attention than it has ever received in this State. Its intrinsic importance is second only to that of the apple, and in its adaptation to various uses, and its duration, by the successive ripening of its varieties from August to midwinter and even later, it bears considerable resemblance to that fruit.

Its culture in Maine is in its infancy. Indeed the same remark might be truthfully made regarding its culture in the country at large; for although long grown, only a very few, perhaps not more than two or three, of those varieties which were highly esteemed thirty years ago, are now extensively cultivated anywhere in the United States. All those at present considered desirable are of recent introduction, and their culture in this State, for the most part, more recent still.

That the pear-tree did once thrive admirably in Maine is sufficiently proved by the existence of the large, healthy, old trees which we occasionally find at the present time in several parts of the State,* bearing, it is true, fruit of poor quality and fit only for

* In a communication from Mr. John Rogers of Kittery, he says: "Pear trees are hardy and very long lived. Many old seedling trees are standing on my farm, one in particular, which is believed to be a hundred and fifty to two hundred years old. It is a mere shell now, being decayed at the heart, but if sound would measure two

making perry and to furnish seeds for healthy, hardy stocks; but undoubtedly capable, by grafting, of being made to produce fruit as buttery, melting and delicious, as their present product is choky and austere. Have we not, in this fact, ample and conclusive proof that if we can furnish suitable location and food, and can find varieties at once hardy enough and good enough, we can compete with any portion of the world in the cultivation of pears? It would certainly seem so, and in the absence of any evidence to the contrary, we have here a sufficient warrant for strenuous exertions to attain so desirable a result. Several varieties, bearing a high character among cultivators generally, originated here, as for instance, the Fulton, which first grew from the seed in Bowdoinham, Sagadahoc county, and the McLaughlin, which cannot be traced beyond Scarboro', and is believed to have originated in Cumberland county, and more recently, a seedling shown by Mr. Nickerson, of Readfield, in Kennebec county, and named for him, gives promise of great value from its combined hardiness, productiveness, vigor, beauty, and fine flavor.

It is believed that more time, money, labor and care have been bestowed on pear culture in the vicinity of Boston during the past twenty years than upon any other spot in the world, and it might naturally be supposed that so much painstaking would afford us reliable results, definite conclusions by which to be guided implicitly: but this does not prove to be the fact. One reason for this is, because the interest there manifested has been so largely directed to the collection of numerous varieties. Every town, village, and quiet nook on the earth's surface, where the pear is grown, seems to have been searched for new sorts, and when obtained they have been put to proof of their qualities under the highest possible culture. Comparatively little attention has been given to a thorough testing of the more promising sorts under the conditions of simply good orchard treatment. The value of these immense collections is by no means to be under-estimated, for in no other possible way could the best be obtained, proved and compared one with another, and the labors of such men as Col. Wilder, Messrs.

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feet six inches in diameter. It has always borne well, bore ten bushels the past season, and made new shoots of from one to two feet in length. An old saying is, 'He that plants pears plants for his heirs,' but it is not so on the quince root. My orchard of eighty dwarf pears, planted in 1850, has borne well for ten years, and are in good healthy condition; some of the pears weighed twelve ounces this year."

Hovey, and a host of others, some of whom possess collections perhaps never equalled elsewhere, entitle them to the gratitude of all. Still this, although a good step in the right direction, and an indispensable one, is not all which is needful. A few such collections would have answered all useful purposes for New England; and had the great majority of cultivators directed the same amount of pains and expense towards the *extensive and profitable* production of fine pears, the results would probably have been of vastly greater importance to the community, as well as more lucrative to the cultivators themselves.

Another reason is, that some kinds which have been amply proved to succeed in Massachusetts are found, upon trial, to be unreliable here. Among these we may mention the Bartlett as a notable instance. This, although not strictly a fruit of the highest quality, is the most popular in market and the most extensively grown for profit. This is due to the early and abundant bearing and vigorous growth of the tree, and the size, beauty, melting flesh and syrupy juice of the fruit; to which we may add that even the half grown fruit, windfalls or thinnings, will ripen well in the house; and there the tree is sufficiently hardy, also, in ordinary seasons, although it suffers in bad ones; but, unfortunately, it is not so hardy with us, and will succeed only in very favorable locations.

In order to be worthy of general cultivation, a pear should possess a certain combination of requisites. First of all, in this climate, it must be hardy enough to withstand severe winters; next, we desire productiveness, vigorous growth, a healthy constitution, and adaptation to a variety of soils, in the tree, and it is well also if it be not too tardy in fruiting. In the fruit we desire fine flavor, size, beauty, and good keeping qualities. Out of the thousand or more of varieties which have been introduced in the last thirty years, there are few in which all these are found in a desirable degree. One is lacking in this, another in that; a great many are wanting in a majority of these requisites. In proportion as they prevail, or are missing, is the value of any given variety for general cultivation. Practically, it is found that hardiness, vigor and productiveness in the tree, connected with tolerably good quality of fruit, are of greater value than superior flavor connected with deficiency in the other requisites. For home use, some varieties may be very desirable and almost indispensable on account of exquisite quality, while from small size or unattractive appearance in the fruit, or feeble growth or scanty bearing in the tree, they would prove unprofitable for market.

For various reasons it is more difficult to arrive at a conclusive decision regarding the value of a new pear, than with an untried apple. The pear is not so uniform in quality during a series of years in the same soil and location; one year it may give promise of high excellence, and the next prove quite poor. In one soil and location it may be all which can be asked, and in a less favorable one quite inferior. The first few years of bearing do not usually develope its full excellence,—for this we must wait until the tree has attained a good degree of maturity. In the apple the effect of an over-abundant crop is chiefly manifested in the requirement for a season of rest, while in the pear a too heavy crop is often connected with small, inferior fruit, so nearly worthless that a few dozen large perfect specimens will give greater satisfaction and will command more money than bushels of the same sort imperfectly grown; and hence the necessity and profit in many cases of severe thinning out of the fruit.

Unless the proper conditions are fulfilled, pear culture may be expected to result in failure; when they are fulfilled, a high degree of satisfaction and of profit may be confidently anticipated. Like everything else which is really desirable and valuable, pears cost something, and they readily command a price fully commensurate with the cost; usually a good deal more from their scarcity. Mr. Nickerson of Readfield, told me that the first time he offered for sale in Portland the fruit of his seedling pear a proposal was made him at once to take all he would furnish at $12.50 per barrel, and he sold his crop at that price. Mr. N. thinks they can be grown as easily as apples, and has several hundreds of trees under way.

Good pears, in our best markets, readily command from five to ten times as much as good apples, and will undoubtedly continue to do so for years to come.

The more opportunity has been enjoyed to compare the prospects of pear culture in Maine and in other sections, the more favorable do ours appear. There are obstacles in both cases, but they are very unlike. In the Middle and Western States they can grow young trees with great facility—whether they be of sorts which we call tender or hardy, and they suffer few losses from winter killing, or from crushing snows breaking them down: but when the trees come to bearing, and in fact as soon as fit to transplant, then comes the Blight—fire-blight it is usually called, and sometimes "frozen sap blight"—though nobody knows either cause or remedy. Suddenly, without any premonition whatever, a limb or a whole tree blackens and withers; being a hopeless case, if it be only a limb, it is amputated, if a whole tree it is dug up and removed. This blight is an awful scourge, sometimes sweeping whole orchards, and more or less thinning almost every orchard. Here, the case is very different: our troubles are almost if not wholly past when once the trees survive the hazards of infancy and early youth and come to a bearing state.

It is not always that we are duly thankful for, or even aware of, the immunities we enjoy. This one of freedom from the blight in pears is a notable instance of such immunity. Another of considerable importance in connection with apple culture is the absence of the *canker worm*. This worm, the occasional scourge of orchards in other New England States, has never, to our knowledge, passed eastward of the Piscataqua river; yet how many of our orchardists have ever thought of it, to say nothing of being grateful for the exemption?

The Pear on the Quince Root.

A great deal has been written on the subject of dwarf pear trees, that is to say, of the pear grafted or budded on the quince root. Within the last ten years our leading horticultural and agricultural journals have teemed with animated discussions in which the most contradictory statements regarding their value have been put forth. Not a few have denounced them as worthless, while others declare that this method is attended with a degree of success unattainable in any other way. The novice, with such conflicting statements before him, both coming from those who profess to have proof from experience, is greatly puzzled, and anxiously inquires, "What is truth?" The discussion has now mainly passed by; certain conclusions have been arrived at; and I will attempt briefly to state the facts as now admitted by the great mass of intelligent horticulturists.

First—Some varieties of the pear, with proper treatment, will succeed admirably on the quince, yielding finer fruit, more of it, and at a much earlier period.

Second—Other varieties will not succeed, and such should not be worked on the quince.

Third—Between those which succeed well and those which do not succeed at all, are others, which will grow on this stock for a longer or shorter term of years, and bear more or less.*

Fourth—Some varieties of the quince, as for example, the Orange quince, which is the one most cultivated for its fruit, are unfit to be used as a stock for the pear.

Fifth—The proper treatment of pears on the quince root is something very different from what may be considered good orchard treatment of apple trees, or even from what would usually be considered extraordinarily good treatment for them. They require a more costly preparation of soil, and a higher culture.

The culture of the pear on the quince is not the novelty which many suppose. It has been practised in France for two hundred years or more, and at the present time at least four-fifths of the trees planted there for bearing (and no country in the world is so well supplied with pears as France) are on the quince root. In England it has been practised certainly for more than one hundred years. In the correspondence between Collinson and Bartram in 1763, the former, probably replying to some inquiry of the latter, says, "What I am persuaded will prevent its dropping the fruit, if some quinces were planted in the lower part of the garden, near the spring, and graft them with the pear, it meliorates the fruit. By long experience our pears are grafted on the quince stock and succeed better than on the pear stock with us." For more than a hundred years no objections were urged against the use of the quince as a stock for the pear, and its advantages were generally recognized.

Within a comparatively recent period, hundreds upon hundreds of new pears have been brought into notice. Great enthusiasm was felt regarding their excellence. Thousands were anxious to fruit these new sorts at the earliest possible period. Nurserymen, to meet the demand, worked them on the quince before it could be known whether they would succeed permanently on it or not, and the demand for stocks was so urgent that any or all sorts were used indiscriminately. Now as some varieties of the pear will grow vigorously on the quince for a year or two, but show unfitness for it plainly enough as soon as they come into bearing, and as thousands of the trees grown as above fell into the hands of

*It should be remarked that some varieties, like the Urbaniste for example, which grow slowly at first on the quince, eventually make fully as strong and permanent trees as any.

persons who knew little or nothing of the requisites to successful culture, it cannot be wondered at if disappointment and denunciation followed the results of the hasty, partial and unskillful experience of those who planted them. On the other hand, there have been those who patiently learned what sorts do succeed on this stock, and liberally bestowed high culture and good management, and the success of these, whether we regard the size, beauty, excellence or abundance of the fruit, or the prices which the product has commanded in our large markets, is very marked and scarcely credible by many who have not witnessed the results.

To the most common objection made to the quince as a stock, namely, that trees upon it are short lived, it is enough to state that many trees are known to be at the present time in active, healthy life, and promising well for years to come, which have been planted out fifteen, twenty, and some of them over thirty years, and which have borne satisfactory crops annually. The term "dwarfs," by which pears on the quince root are usually called, conveys to some minds an erroneous impression. It is true the tree is dwarfed somewhat by the influence of the stock, and thus early productiveness is induced, but the trees are not necessarily stunted, nor very small, as their trunks not unfrequently attain a circumference of fifteen or twenty inches, and sometimes more.

The principal requisites to success are:

First—A sufficiently sheltered location, either naturally so, or made so, by screens of evergreens planted for the purpose, or by some other means.

Second—A good, strong, deep, moist soil, resting upon a naturally porous subsoil, or else thoroughly drained. This should be worked twenty inches or two feet deep, and made rich.

Third—Plant trees budded either upon the Orleans or the Angers quince, and no others.

Fourth—Plant no varieties which are not known to succeed well upon the quince root.

Fifth—Plant so that the point of junction between the quince and the pear* shall be *three inches below* the surface when the planting is finished and the surface leveled. This serves several purposes.

*The quince *should be budded* with the pear, in the nursery, *as near the surface* of the ground as convenient—but the above rule is to be adhered to, *without regard to the height at which the operation might have been performed.*

(*a.*) The stock is thus kept soft and moist, and so swells more evenly with the pear as it grows. It also throws out roots from the stock fully up to the point of union with the pear. The quince is the only one of our fruit trees which does this freely. It should be remembered that the office of the quince in this case is simply to furnish *roots* for the tree, and if properly planted, only a few years will elapse before the *main roots* will proceed from just below the point of union. Planting dwarf pears at the same depth at which they stood in the nursery when budded, is almost sure to keep them *dwarfs*, in the objectionable sense of the word in which it is sometimes used, and to insure their being short-lived. Doing this has been a common error, and the cause of numerous failures.

(*b.*) It favors the throwing out of roots from the pear itself, thus adding to the vigor and longevity of the tree. In this case the tree loses somewhat of its distinctive character as a quince rooted tree, but by the time this takes place it has commenced bearing, and being well furnished with fruit spurs, it continues to bear as freely as if it had no roots directly from the pear.

(*c.*) The quince is as liable to the attacks of the borer as the apple tree, but as the eggs producing this worm are never deposited below, but rather at and above the surface, it is thus secured from its depredations.

Sixth—Bestow clean culture. Keep all weeds down and the ground mellow. Mulching is of great assistance. *As the roots of the quince do not extend far or wide like those of the pear or apple,* but are mostly small and fibrous, it is necessary to place a sufficiency of food within their reach. If the ground was properly prepared at the outset, this is best done by an annual top-dressing.

Seventh—Good pruning, thus giving proper form to the tree, and by an annual shortening in of the young shoots, limiting the size of the tree to the amount of its roots. The branches should be as low as consists with safety from breaking down by heavy snows.

Eighth—Never allow the trees to carry more fruit than they *can ripen to perfection, and at the same time keep up a healthy growth of both top and roots.* This involves the necessity oftentimes of a severe thinning out of the fruit in its early stages—and requires some nerve on the part of one who has not learned its necessity by experience.

If these things be attended to, the cultivator will find the pear on the quince the most delicious and bountiful of fruits, richly rewarding all his care. If they be neglected, little satisfaction may be confidently anticipated. One tree well cared for will give more satisfaction than a hundred neglected.

The principal advantages of trees on the quince over those on the pear are:

First—They can be transplanted with greater ease, and of larger size, and *with almost certainty of their living.*

Second—They come earlier into bearing, often the next year after planting, and usually within two or three years, while on the pear it often takes five, ten or fifteen years.

Third—They are more within reach and easy control; afford greater facilities for pruning, thinning out and gathering of fruit, together with less liability of its being blown off by high winds.

The facility with which the pear throws out roots of its own, when trees on the quince root are planted, varies considerably with different varieties. Some do it readily, (never, however, unless planted at the proper depth,) while others seem little inclined to do so. Generally, those which seem to be not very well suited with the quince, as a feeder, do so most easily.

Such rooting can be hastened and greatly facilitated by the following method. After the tree has had several years' growth and is well established, remove the earth from around the trunk, and with a small sharp gouge cut upward from the point of union, where the pear is usually somewhat swollen, and partially detach several strips, consisting of the bark and about a quarter of an inch in depth (in the center of each) of wood, and about two inches in length, leaving each attached at its upper part. Draw the bottom of the strips a little from the trunk, and place a little fine earth between, so as to prevent adhesion; then replace the earth about the tree. The operation should be performed a little before midsummer, and as the descending sap is thus obstructed, it soon forms granulations upon the portion thus parted, and from these roots are thrown out into the soil. It is easier done with a gouge prepared for the purpose by being bent about three inches from the cutting edge.

When rooting is thus effected, we secure the benefit of both pear and quince roots as feeders of the tree, and combine early fruiting and the other advantages of the quince with the longevity of the pear. Upon such varieties as are decidedly better upon the quince it is not advisable, but in many cases it is a great gain.

Double Working. When it is desired to cultivate a variety upon the quince which does not succeed when budded directly upon it, such sort may be grafted or budded upon some free-growing variety already well established upon the quince root;—for instance, the Seckel can thus be grafted on the Beurre d'Amalis, and so a tree be obtained which will bear much earlier than the Seckel would upon the pear root. This plan is better adapted to the wants of the amateur than for the orchardist. It can be profitably practised only to a very limited extent.

Pruning and Training of Dwarf Pears.

The pruning and training of pear trees in a way to bring them into a pyramidal form is almost universally recommended in books on fruit culture, and very minute directions are laid down for its accomplishment. As very few of our readers will be inclined to devote the time and patience requisite, it will be only briefly noticed. It is really a very pretty method, if one can afford it, though better fitted to sections where deep snows prevail less, than here, and so where less danger exists of the lower limbs being crushed.

For this purpose the trees are planted at one year old, at from eight to ten feet apart, (usually on the quince root, although those on the pear root may also be trained in the same way.) The first year's growth is headed back to within six or eight eyes. Consequently the remaining buds shoot vigorously. About the end of June the growth of all but the leading shoot is stopped by pinching the ends, and if any are not in the position desired, they are tied so as to bring them to it. The leader grows on vigorously and sometimes it is stopped the same season, and sometimes it is cut back the following year, to induce the throwing out of another tier of limbs; and so on, in successive years, until the tree has attained its full size; and all the while "stopping" (by pinching its end so as to leave an inch or two which shall then develope into a fruit spur,) every shoot which dares to start where you wish it not to grow. It involves close attention and much skill. Some sorts assume a good, regular form with much less care than others, while some are so bent on awkward ways as to defy almost any amount of skill and attention.

For our use it is well to let them grow as dwarf standards; that is, just like other standards, only with limbs as low as consists with safety from crushing snows, and the heads retained within a smaller extent. With suitable age, there is rarely lack of fruit enough without continual "stopping," and often more time is needed to thin it out properly than can well be spared for the purpose. There should be at least the annual pruning before referred to, and in doing this, if care be taken to cut *above a wood bud on the outer side* of the twig or limb, or on the side facing the direction in which it is desirable that the shoot should extend its growth, *a great deal may be easily accomplished towards improving* the form and general appearance of the tree, or towards giving it any peculiar form desired.

If any attempt is to be made at systematic training, I would suggest the adoption of the "wine-glass" style, introduced by Capt. W. R. Austin, of Dorchester, Mass., as better fitted to our needs and less trouble than the pyramidal form. It is thus described, by the editor, in Hovey's Magazine of Horticulture:

"When the young tree of two years old is planted, the centre shoot is cut out, and the side shoots are pruned in so as to obtain from the four or five laterals as many as seven or nine branches: these are preserved entire, every side shoot upon each being cut in to one or two eyes as they make their appearance; these main shoots are slightly cut in at the winter pruning, and encouraged in making a new growth each year, pinching off at all times every side shoot, by which means they are transformed into fruit spurs; as the shoots increase in length, they diverge at the top until they assume quite a wine-glass or vase shape. When of a maximum height, say ten feet, they are stopped, and are not allowed further extension. By this process, these main shoots become studded with fruit spurs from top to bottom, of which the Duchesse afforded grand examples, being covered with splendid large pears.

The advantages of this style, besides ease of management, are a more evenly balanced tree, which the wind does not affect so much as pyramids, and the sap is not directed to the top, but is distributed throughout these main branches equally; hence the trees are full of fruit from the base to the top, and at the same time it is more evenly sized. Another important thing is, that there are no lower side branches to become crowded and die off for want of a good circulation of air, as is too common with pyramidal trees. The principal advantage is in the ease with they may be managed by those who have not the skill to prune pyramids, which require a good deal of care to keep them in symmetrical shape and at the same time productive and healthy. Great judgment, also, and considerable skill are required to know when to prune, but in Capt. Austin's style, all that is important is to extend the main shoots about seven to ten in number, and no more, and cut off every side shoot (by summer pinching principally) to one or two eyes."

Trees grown in this style, seem to be, substantially, dwarf standards, skillfully and systematically trained, and the method is commended to the attention of cultivators.

Standard Pears.

The principal advantage attending the use of the pear stock is, the greater size and longevity which the trees attain. Trees on the pear stock are more suitable to be trained standard high, and planted in orchards, (rather than gardens,) than those worked on the quince root. As many sorts succeed best on their own stock, we must, with such, be content to forego early fruiting and wait patiently for them to attain a bearing age. The trees once planted, the years slip by more rapidly than we think for at the outset. Novices in fruit culture are usually in a great hurry to have their trees bear, but with ten, or twenty, or thirty years experience, they become quite willing to plant small trees, and to have them grow to a good size and attain sufficient strength and age before fruiting. Experience gives wisdom which, sometimes, is obtained in no other school.

Pears on the pear stock do not require so high culture as on the quince, but they require more care and attention than apples. They require a good exposure, with sufficient shelter, either natural or artificial, from high winds and cutting blasts. Next, a good deep strong soil and a porous or thoroughly drained subsoil, rather moist than dry, but never retaining stagnant moisture in the soil. If not so naturally, it may be amended by deepening, draining, enriching, and good cultivation. Animal manures may be given more freely than to the apple, yet *never so as to induce a late, unripened growth of wood*, which is one of the most fruitful sources of danger in our winters.

Other Stocks for the Pear. The use of the common White Thorn of our woods, (*Crataegus coccinea*, of botanists, bearing scarlet berries,) as a stock for the pear, has been attended with some success. In my own experience, the Flemish Beauty has often done well on it. Where good stocks can be readily obtained, it is worthy of a more extended trial than has been given it.

Very diverse accounts are given by cultivators regarding the results obtained by grafting the pear on the Mountain Ash; (*Pyrus Americana* of botanists, often called Round-wood.) Most fruit books, when speaking of it, direct that small stocks be grafted near the ground, and some cultivators among us have given me to understand that this practice has succeeded, but although some ten years ago, I worked several thousand in this way, and with twenty or thirty different varieties, I got no trees to succeed for any length of time, nor to come into good bearing at all; while by grafting the limbs of grown trees ten or fifteen feet high and three to six inches in diameter, I have seen them loaded with bushels of fine fruit for several years in succession; but even such trees may not be expected to succeed for any long term; a few years of bearing is all that can be expected.

As with the quince, some varieties succeed well, others but poorly, and others not at all upon the Mountain Ash. The best I have proved are, Flemish Beauty, Fulton and Belle Lucrative. The Bartlett has also done well. Even the White Doyenne, (St. Michael's), which usually cracks so badly, gave good crops on several trees.

The *Amelanchier Canadensis*, variously known as Sugar Pear, Juneberry, Shadbush, Serviceberry, &c., has also been tried to some extent as a stock for the pear. I have had no personal experience with it, and from what I had seen or heard, attached little importance to its use. But while visiting some orchards in Penobscot county, during the past summer, I found a very successful fruit grower, Mr. Jefferson Stubbs, of Hampden, had experimented considerably with it, and was highly enthusiastic in his anticipations of valuable results. He showed me some trees of great vigor and promise—one of three years growth, grafted at the grouud, was fully nine feet high—another, grafted eight or ten years ago, he told me had brought him fifteen dollars for the fruit, and for premiums on it, at the time when another, of the same variety, (Flemish Beauty,) by its side, and on the pear stock, of the same age and a little larger, had yielded only eighteen pears. He had a dozen or more varieties grafted upon it and of these the

Flemish Beauty, Bartlett and Buffum promised best. In all, there might be two to three hundred trees, planted out for bearing. He transplants them from the woods, heading in the tops severely at the time, and after growing one year, grafts them, (saddle grafting as figured and described on page 166 and very skillfully done—no failures,) keeps the soil well cultivated and very rich.

A question frequently asked is, which is the best pear? Rather an absurd question it is too, for one may be best at one season and another when that is gone by; one best as regards intrinsic excellence, and another to cultivate for profit. Again, tastes differ, one favors a sweet pear, while another prefers a high vinous flavor. The question, unless qualified or limited, cannot be answered.

It is really a great desideratum to obtain a list of six, ten or twelve varieties of unimpeachable merit, which shall be really good, productive and hardy sorts, filling the seasons well, so as to furnish a supply from the earliest to the latest, and better than any other six or twelve which can be named. But unfortunately our experience is too limited to do this. As before remarked, the better sorts are all of comparatively recent introduction and they have not all been cultivated extensively enough in various parts of the State and in differing soils, to furnish the requisite evidence. It takes a good while to learn everything about any one variety which is to be learned by experience, and besides this, new sorts are all the while coming along, which as they come to proof, one after another, play havoc with lists made out a dozen years before. There is no good cultivator of pears anywhere, whose opinions have not undergone considerable change as to the relative merits of varieties within a shorter period than a dozen years.

Not less than five hundred sorts, which have come recommended as worthy of culture, have been more or less extensively proved in the State—sometimes nearly a hundred have been shown by single cultivators at our annual exhibitions. Last year Mr. Warren Sparrow exhibited eighty or more, from his grounds in Westbrook, at the fair of the Portland Horticultural society. Of these many kinds, four hundred or more have passed into oblivion or ought to; but when we come to the others it is no easy task to state accurately their relative worth.

An attempt is made below to give a brief description of such as, with the existing attainments in local pomological knowledge, are supposed to be most worthy of cultivation. The critic in such matters will notice that many sorts are omitted which are highly spoken of in almost all our works on fruit culture, as for instance, Bloodgood, Beurre Bosc, Beurre D'Aremburg, Golden Beurre of Bilboa and others, and it is believed there is sufficient reason for the omission in lack of thrift, hardiness, or other requisite for our use. Others still, as Dunmore, Dix, St. Ghislain, &c., good pears and hardy, are omitted because they have no *special* merit, and are believed to be excelled by others which are described; for it is an object not to have the list so large as to confuse and hinder, rather than help a judicious selection, and some are omitted because we do not know enough about them to say anything. A few are mentioned not to recommend them, so much as, (being popular sorts elsewhere,) to suggest caution with regard to planting these in Maine.

A word, however, may be first in place here regarding the

Gathering and Keeping of Pears.

Nearly all pears ripen with a finer flavor and texture if picked early and matured in the house. There are a few which may ripen upon the tree and be as good, like the Dearborn's Seedling for example, but the number of such is very small. Some which are nearly worthless if ripened on the tree, become rich, melting and delicious if ripened in the house. Gathering at the proper time will, in nearly all cases, prevent the *rotting at the core,* which otherwise greatly detracts from the value of many sorts, particularly early varieties. It requires some practical skill to determine the proper time to pick pears, and this must be learned by observation and experience. As a general rule early pears are best if picked about *ten days* before they would ripen on the tree; for some, a week would answer, and others are better if plucked at a fortnight before maturity. If the season is of usual and equable moisture, a good rule is to take off the fruit when the stem will part easily from the spur upon its being turned up at a right angle. If it be a dry time in August or September, be cautious about acting upon this rule, as a heavy rain at this season often causes them again to adhere firmly. They should not be picked until the full size is attained, nor on a wet day. Old Thomas Tusser in his "Five Hundred points of Good Husbandry," in treating of the labors of September, says:

"Out, fruit go and gather, but not in the dew."

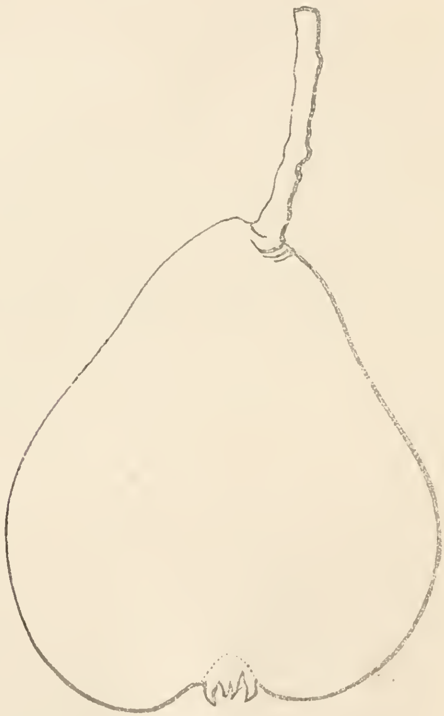
And again,

"Fruit gathered too timelie will taste of the wood,
Will shrink and be bitter and seldom proue good."

DESCRIPTIVE LIST OF PEARS.

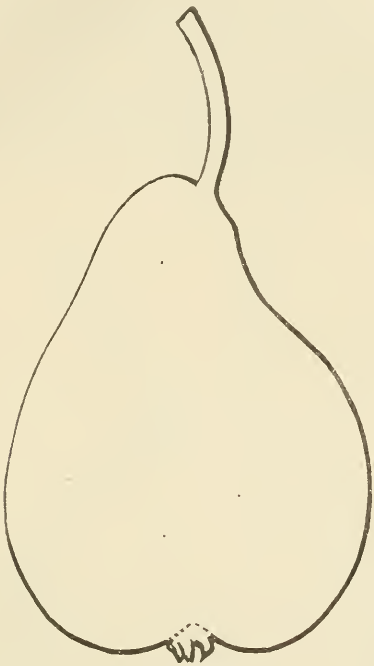
Summer and Early Autumn.

Bartlett. The most popular of early pears, and where the climate suits it, perhaps deservedly so, for its combination of good qualities; but unfortunately for us, it is one of the tenderest. As in other States south and west of this, so here, it has been more extensively planted than any other variety, and its general failure



Brandywine.

has done much to discourage all efforts towards pear culture. Occasional and partial success has attended it in favorable localities and sheltered situations. We have grown some bushels of the fruit, but if our efforts—continued for twenty years, and accompanied by the loss of several thousand trees of various ages—furnish sufficient evidence, we pronounce it *unreliable*, and one which should be planted sparingly and only in city gardens or other very favorable situations.



Beurre Giffard.

Brandywine. A native fruit of much merit, introduced to notice by Dr. Brinkle. The tree is of good form, hardy, of vigorous growth, uniformly productive and the fruit of fine quality. Rather above medium size, yellowish green sprinkled with russet and a reddish cheek in the sun. Flesh juicy, melting, sugary and vinous. Succeeds finely on the quince root. Ripens with the Bartlett. Mr. Hovey in describing it, says: "The qualities of the Brandywine are peculiarly its own, and cannot be compared with any other variety. Its flesh is slightly firm, yet perfectly melting; and its flavor, without being highly perfumed, appears to be a concentration of several sorts, being almost as sugary as

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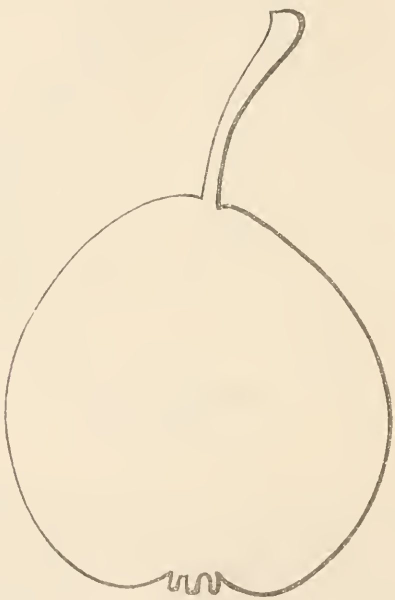
the Seckel, yet with the champagne smack of the d'Aremburg. It is as distinctive in its character as the Seckel."

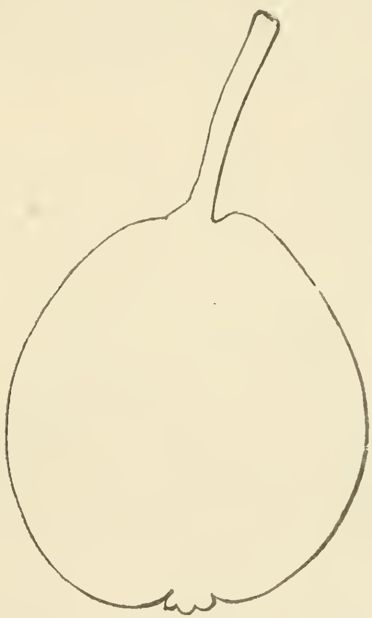
Beurre d'Amalis. One of the hardiest and most profitable September pears. The tree is a rampant grower, irregular and straggling in its habit, and very productive. Fruit large, dusky greenish yellow and sometimes faintly russetted. Flesh rather coarse grained, melting, juicy, and in quality varying from good to very good. It ripens about the same time as the Bartlett. With some cultivators in the vicinity of Portland, it has given better satisfaction than any other, owing to its combined hardiness, productiveness and good quality. It succeeds perfectly on the quince, and is rarely grown on the pear root.



Dearborn's Seedling.

Beurre Giffard. In quality and beauty this pear is not excelled by any other early sort. Bright yellow, with a beautiful crimson cheek, melting, rich and delicious. The tree is usually a slender grower, although in some situations pretty vigorous. It can hardly be dispensed with in a choice collection, but is not recommended for extensive planting. Succeeds moderately well on the quince.

Dearborn's Seedling. A very excellent native fruit; originated by General Dearborn about forty-five years ago. In Massachusetts, and farther west and south where the Bartlett is successfully grown, its more showy qualities have greatly eclipsed the merits of this pear which ripens at about the same time. Its only fault is its size, which is below medium; while its excellences, both of tree and fruit, are such as to give it a high rank among early pears for Maine. I have seen trees of it in this State, bearing crops

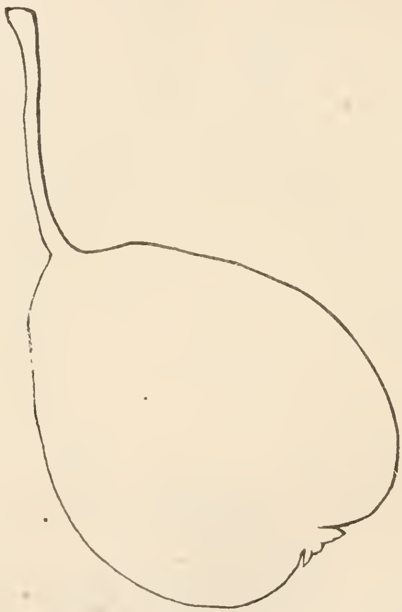


Doyenne d'Ete.

which sold for from ten to fifteen dollars annually. The tree succeeds in a variety of soils, is very hardy and bears abundantly and regularly. The fruit has a clear, smooth, light yellow skin; flesh, white, juicy, melting, and of sprightly flavor. It deserves a place in every orchard and fruit garden. Does not succeed well on the quince.

Doyenne d'Ete, *or Summer Doyenne.* This is the earliest ripening pear worthy of cultivation. It has been considerably grown as a dwarf, but it is not well adapted to the quince, as on this stock the tree soon becomes feeble and stunted. On the pear stock it is a vigorous grower, with rather slender shoots, and an early and profuse bearer. Fruit small, yellow, with bright red on the sunny side, juicy, melting and well-flavored. It should, (like most early pears,) be picked a week, at least, before maturity, as it becomes mealy and insipid when ripened on the tree. A hardy and very desirable variety ripening early in August.

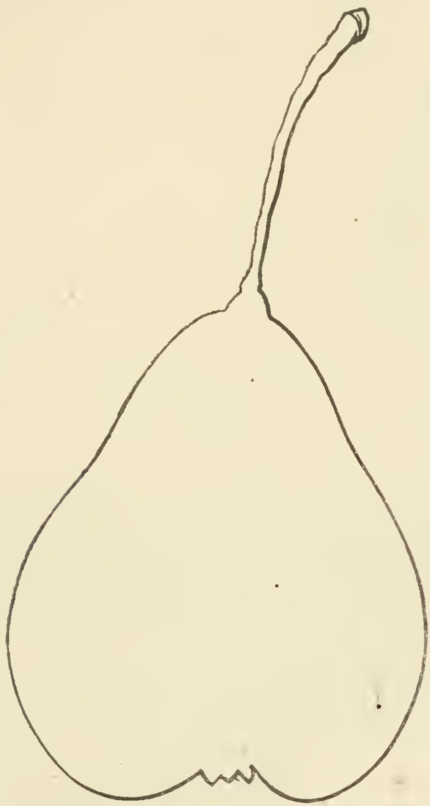
Madeleine. A very early, medium sized, pale yellow pear, juicy and good, which comes in season just after the Summer Doyenne. It has been grown in this State above fifty years and is found to succeed both on the pear and quince. The tree is hardy



Rostiezer.

and productive, with long, erect branches. In damp, clayey soils the fruit is found to be rather astringent, and in some seasons it rots on the tree, but generally gives satisfaction.

Rostiezer. An early, hardy, very productive and delicious variety, of German origin. Small to medium in size, pyriform, brownish russet in the sun, and bears in clusters; stem long and slender; flesh juicy, melting, sugary, vinous and aromatic. In quality it is scarcely excelled by the Seckel or any other. Succeeds equally on the pear and quince. A vigorous grower, but of awkward and irregular habit, throwing out few and strong and often ill placed shoots; needs judicious pruning to produce tolerable symmetry.



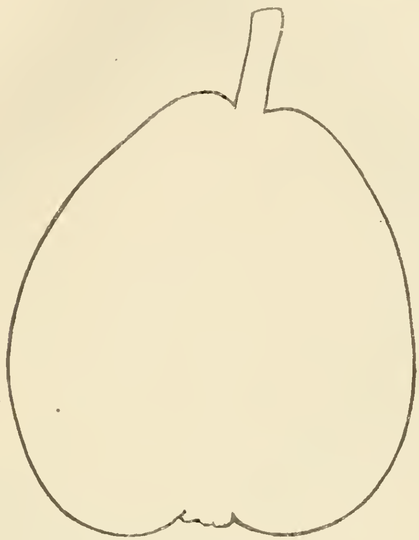
Tyson.

Tyson. A choice early pear of American origin. The original tree was found in a hedge on the farm of Jonathan Tyson, in Jenkinstown, Pa., and is said to be fully two feet in diameter. Fruit of medium size, pyriform; skin bright yellow at maturity, with a crimson cheek. Flesh fine, juicy, melting, rich, sugary and somewhat aromatic. Tree of vigorous growth, upright habit, very productive and very hardy; but is slow in coming to a bearing state on the pear stock, and, like Flemish Beauty and some others, is of uncertain propagation on the quince, as sometimes only a small proportion of the buds will grow. Trees on the quince, if once well started, however, succeed finely, so far as I can judge by ten years' experience of it. Its tardiness in fruiting is the only fault I have found, and this is fully atoned for, when old enough.

AUTUMN.

BELLE LUCRATIVE.

BELLE LUCRATIVE—*Fondante d'Automne*. Of medium size; form roundish obovate; skin greenish yellow, lightly russetted. In quality of fruit of unsurpassed excellence, being exceedingly juicy, melting, and of a rich, sugary and yet vinous flavor. Last of September and October. Tree of moderate vigor, upright habit, hardy, productive, and succeeds on both pear and quince. If the fruit was somewhat more attractive in its external aspect, and the tree a more robust grower, the Belle Lucrative would be nearly faultless.

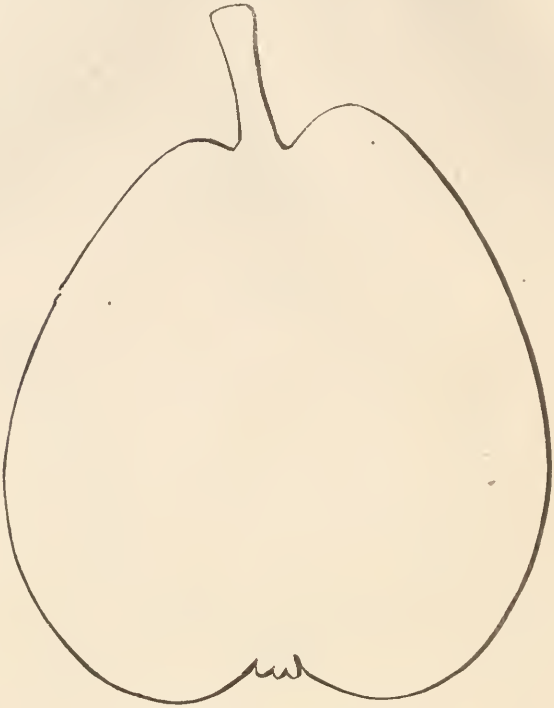


Buffum.

Buffum. Of Rhode Island origin, from seed of St. Michael. The tree is hardy, of very vigorous growth and upright habit, bearing heavy crops of very handsome fruit, somewhat variable in quality, usually good and often very good, always salable. One of the most profitable orchard varieties, perhaps more so than any other; of medium size, oblong obovate; yellow, with a red cheek, sprinkled with brown dots; brownish green before ripe. Flesh white, melting, juicy, and of sweet and excellent flavor. Succeeds well on the quince. October.

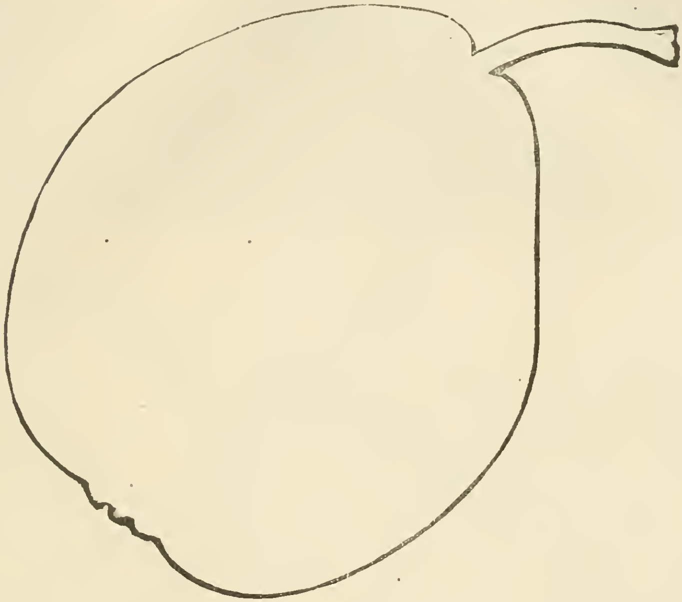
Doyenne Boussouck. A French pear of large size, beautiful and excellent; an early and good bearer; tolerably vigorous and usually hardy; skin rough, deep yellow, partially russetted, with a brighter cheek. Flesh buttery, melting, juicy and high flavored. Succeeds on the quince. September and October.

Flemish Beauty. Of foreign origin ; one of the hardiest of pears. The tree vigorous, healthy and an early and abundant bearer ; has

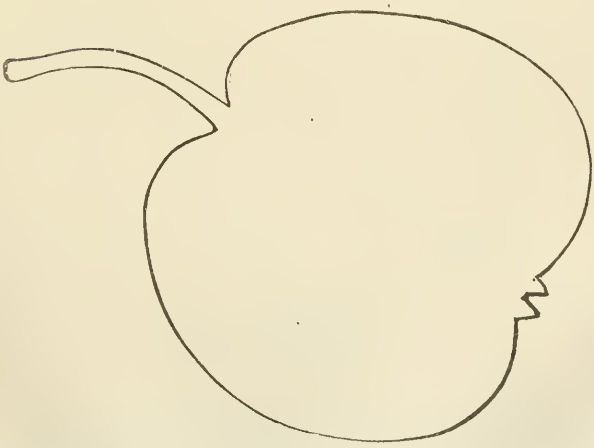


Doyenne Boussouck.

been planted, perhaps, more extensively than any other, and is a universal favorite. Fruit of large size, obovate, somewhat variable in appearance ; in sheltered situations the skin is usually yellow with a bright brownish red cheek and very beautiful. In some seasons, and in exposed situations, it is often covered with russet, and not so handsome. Flesh yellowish white, juicy, melting, sugary and rich. Should be picked, at least, ten days before maturity, while yet green, tasteless and hard, and even before the stem parts readily from the twig, and ripened in the house ; as otherwise it becomes too soft, loses flavor and decays at the core. In my own grounds and in some others, I have noticed, for a few years past, a part of the fruit has cracked. When worked on the quince it is not sure to grow, many buds failing at times, but those which start well, make vigorous and permanent trees. It succeeds with all the different stocks upon which I have tried it, and de-



Flemish Beauty.



Fulton.

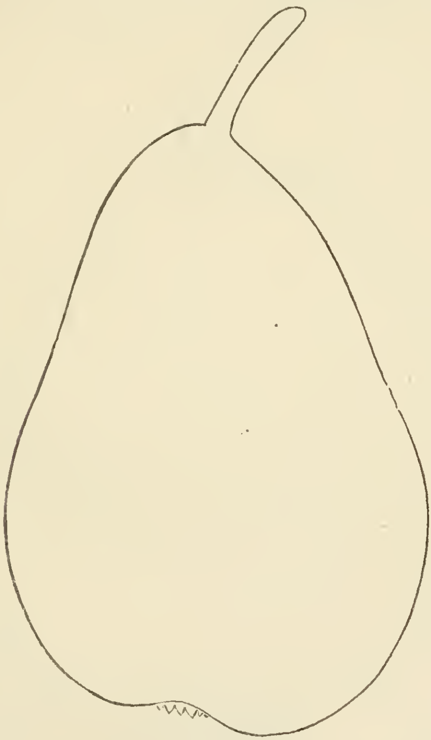
cidedly better upon the Mountain Ash, Thorn and Juneberry, than any other sort yet tested. Usually ripens about the end of September.

FULTON. An excellent and valuable pear, which originated from seed planted by the late Mrs. Fulton, on the farm now owned by Dan Fulton, in Bowdoinham, formerly a part of Topsham, in this State. Usually below medium size, roundish, flattened, gray russet, changing to cinnamon as it ripens. Flesh tender, rather juicy and half buttery, with a rich, sprightly, agreeable flavor; is in eating for a considerably longer time than most pears.

LOUISE BONNE DE JERSEY.

October, November. It should be grown on pear stock, as it succeeds but poorly on the quince. I have had fine fruit from scions set in the Mountain Ash. Rather a slow grower in the nursery, with slender shoots, but in time makes a fine tree in the orchard. It is hardy and an abundant and regular bearer.

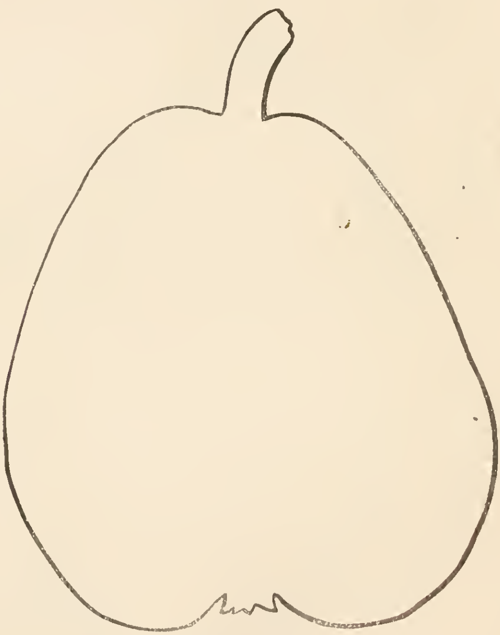
Louise Bonne de Jersey. Few pears have given more general satisfaction than this; especially when grown in warm, dry soils, and on the quince root. In clayey soils it is often astringent. The tree is a good grower, hardy and very productive. The fruit large, pyriform, often a little one sided. Skin greenish, changing to bright yellow, with a crimson cheek in the sun, sprinkled with numerous grey dots. Flesh juicy, melting and high flavored. October.



Nickerson.

Nickerson. A seedling which originated in Readfield in this State, on the farm of Mr. Nickerson and very little disseminated. I am not aware of its having fruited elsewhere as yet. In form and general appearance it somewhat resembles Louise Bonne de Jersey, and the specimens sent me were equal to that variety in quality. The original tree, though not old, and only about seven inches in diameter, bore three barrels in 1860, which sold at twelve and a half dollars per barrel. Young trees show vigorous growth and fine form. The evidence of sufficient hardiness and productiveness seems conclusive. October.

Seckel. This is introduced, not to commend its culture, but because of its great popularity elsewhere, and to caution growers from expecting too much of it here. True, the tree is hardy and the fruit *best*, the standard of excellence; but it requires a longer and warmer season, and a richer soil than ours, to bring it to

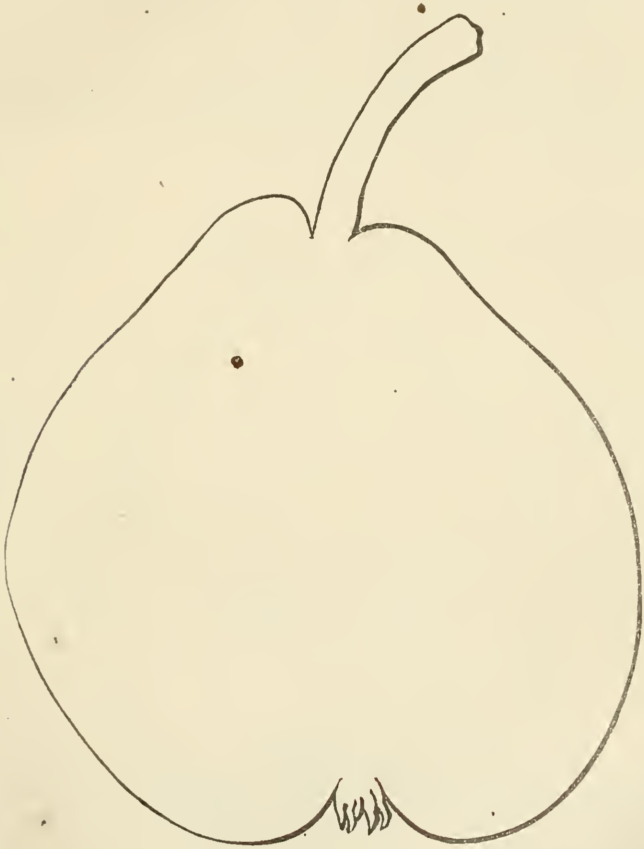


Beurre d'Anjou.

perfection. With the best culture we find the tree a *very* slow grower, not very healthy, and the fruit small. Some good fruit may be had by grafting it in the limbs of a vigorous, healthy grown tree, but we have never seen it here at all comparable with the fruit as often found in Philadelphia, sometimes weighing four, five or six ounces, and report says sometimes larger still.

Late Autumn and Early Winter.

Buerre d'Anjou. This noble pear, introduced from Europe by Col. Wilder, possesses qualities which place it in the front rank. The tree hardy, vigorous and productive, the fruit large, fair, rich and keeping well, it deserves extensive culture. Succeeds equally well on the pear or quince root. Fruit large to very large,



Buerre Diel.

roundish obovate, often larger on one side than the other. Stem short and thick. Skin greenish yellow, sprinkled with russet and brown dots. Flesh melting, very juicy, with a rich, brisk, vinous flavor. It is usually in eating through the whole of November, and some years I have kept them in perfect order till the twentieth of December.

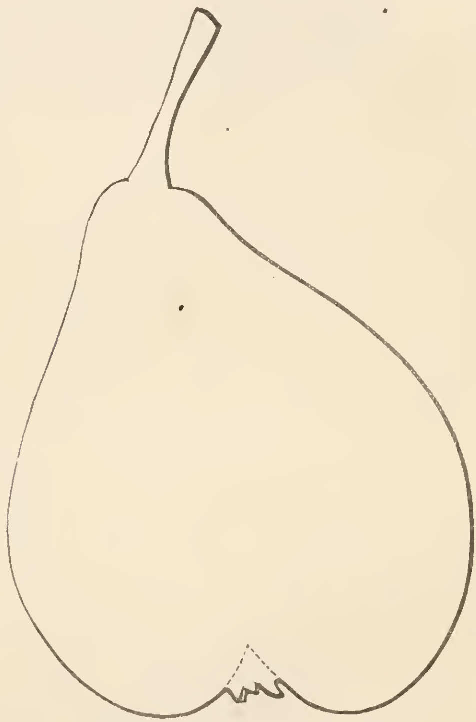
Buerre Diel. A magnificent Belgian fruit raised by Dr. Van Mons. It is a pretty general favorite, being rarely absent from autumnal exhibitions where pears are shown. The tree is very vigorous and usually proves hardy, bears just about enough not to require much thinning. Succeeds best on the quince root. Large, obtuse pyriform, at maturity yellow, with large brown dots and markings of russet. Flesh rather coarsegrained towards the core, but juicy, rich, sugary, and half melting. I would not advise planting it extensively, as it sometimes cracks or otherwise does not succeed well. October and November.

Beurre Hardy.

Beurre Hardy. A vigorous growing tree on both pear and quince. Seems particularly adapted to culture on the last named stock. Fruit rather large, often a little one-sided, like Beurre d'Anjou. Skin greenish yellow, russetted and shaded with brownish red, and sprinkled with brown dots. Flesh buttery, melting, very juicy; vinous flavor, and perfumed. Of comparatively recent introduction, but has, wherever proved, gained a position among the best. October—November.

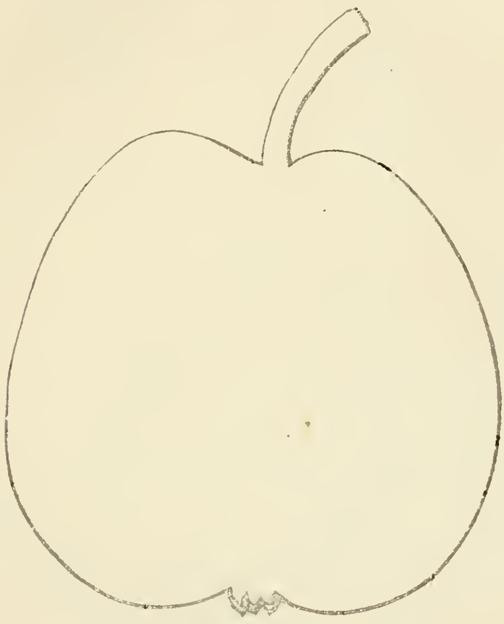
DUCHESSE D'ANGOULEME.

DUCHESSE D'ANGOULEME. The largest good pear we have—sometimes weighing a pound or more. Skin greenish yellow, often with a red check, sometimes partially russetted; surface uneven and knobby. Flesh melting, very juicy and rather coarse towards the core; of rich aromatic flavor, and is in eating condition a good while. It is so much better on the quince, that it should be grown only on this stock. The tree is a vigorous grower but not perfectly hardy, neither can it be considered a very tender sort, as it succeeds generally, but suffers in very severe winters. It is irregular as to production, sometimes bearing very heavily, and again bearing little or nothing. In my own experience, barrenness has often followed a very abundant bloom. The trees appear to be exhausted by excessive flowering, and a severe thinning out of the bloom buds as they begin to swell, remedies the evil, and a large crop sets. It needs severe thinning out to attain full size. October, November. Succeeds best in warm, dry soils.



NOUVEAU POITEAU.

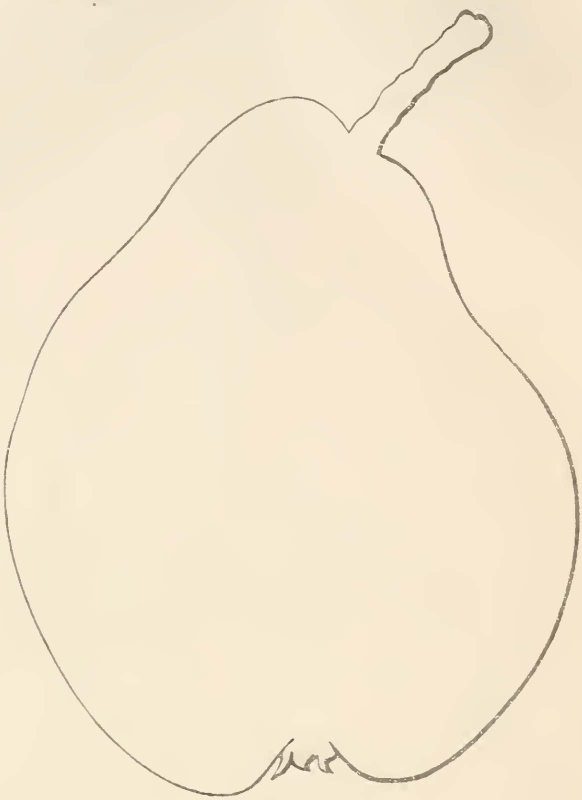
NOUVEAU POITEAU. Of foreign origin, being a seedling raised by Dr. Van Mons; one of the most vigorous of growers, and proved hardy enough to withstand the winter of 1856–7, with scarce any injury. It forms a fine shaped top and is very productive; promises to be a valuable orchard variety; succeeds perfectly on the quince. Fruit large—sometimes twice as large as the figure here given of it; skin green, covered mostly with russet. Flesh white, buttery, melting, with a vinous, refreshing flavor, usually rich, but in some seasons rather less so, and the texture of the flesh has occasionally proved soft. November.



OSWEGO BEURRE.

OSWEGO BEURRE. A Bergamot shaped pear, which from its great hardiness and productiveness may prove a valuable orchard fruit; medium size, roundish, cinnamon russet. Is in eating condition a long time. Has proved variable in quality, some seasons being very fine indeed, and in others decidedly inferior. November, December.

SWAN'S ORANGE—*Onondaga*. A seedling of Connecticut, whence it was carried to New York, and thence brought to notice. It is said to vary in quality in different situations, but here it has uniformly proved one of the best of its size and season. Extremely hardy, vigorous, and very productive. Large, melting, buttery and rich: deep yellow, sprinkled with russet dots. and from its shape and

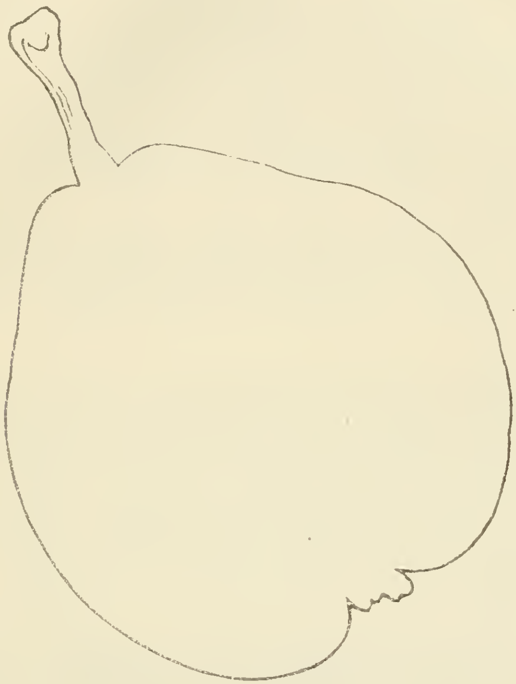


SWAN'S ORANGE.

color was called Orange. Said to do best in a strong loamy or clayey soil. Succeeds on the quince. A very valuable orchard pear. October and November.

URBANISTE. Upon the pear root, this has proved unproductive. I have a tree more than twenty years old which has never borne half a peck in a year; but upon the quince root it is one of the most desirable: and this, too, notwithstanding in its earlier years it is of slow growth and refuses to bear until it has grown to good size and has laid by capital enough to do a good business.

It then begins at once to bear full crops of most estimable fruit which remains a longer time in eating condition than most others. The tree, when once well under way, is a vigorous grower and



Urbaniste.

forms a symmetrical top: while in healthiness and hardihood, it is unequalled by any other, and it promises the same in regard to longevity. Fruit medium to large; fair; smooth, pale yellow, spotted with grey dots: melting, juicy and of rich flavor. October, November.

Winter.

The quality of late pears depends very greatly on the perfection in which they are grown, and the way in which they are ripened off. Inferior specimens are not often worth the trouble of harvesting, no matter what care is given subsequently. Hence, one reason for good culture and thinning out of the fruit early in the season, to secure size and quality. They must not remain too long on the tree. Most kinds lose, rather than gain, if left on after the first week in October, and none should be left after the middle. Handle with care; gather on a dry day and put in a cool cellar, not damp and not too dry; if wet, they rot: if too dry, they shrivel. Where there are but few, the better mode is to put them in barrels or boxes, between layers of apples. When within a fortnight of maturity, bring them into a warm room, and keep in close drawers. In this way they will soon develop the richest hues, the most perfect texture and the highest flavor of which they are capable.

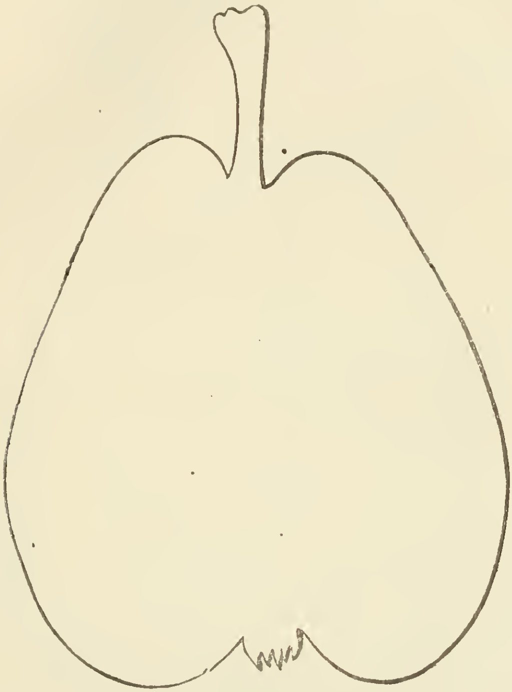
The number of winter pears which has given satisfaction in this State is very limited, and there is greater need of acquisitions to it, than to the number of those ripening at any other season.

Easter Beurre. This is mentioned here because it has often been extolled too highly. When perfectly well grown and ripened, it deserves all the praise given to it, but this cannot be done in Maine. Although hardy, it requires a longer and warmer season than ours, to arrive any where near perfection. In a very few instances it has ripened tolerably well in warm gardens.

Glout Morceau. Few pears, really so good as this is when in perfection, have given so little satisfaction in Maine. If planted, it should be only on the quince root, for which it is peculiarly adapted, and then as much patience must be exercised as for almost any pear (except the Dix) on pear root. After a lapse of ten or twelve years or more, I have heard cultivators here pronounce it the most valuable of any. The tree is vigorous and very hardy. The fruit, in perfection, is large, of excellent quality, and keeps late into winter, but until the trees are near maturity, the fruit is usually worthless.

Passe Colmar. Very hardy, a good grower: fruit of very good quality and keeps late. Succeeds on both pear and quince. Its fault is excessive productiveness, requiring altogether too much thinning out to secure specimens of good size; and small ones are not worth growing. January, February.

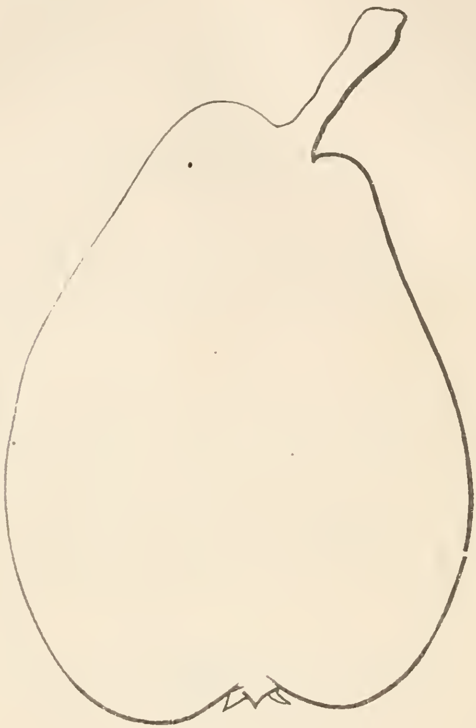
LAWRENCE. One of our best late keeping pears; of American origin. Tree of moderately vigorous growth, regular shape, exceedingly hardy, very healthy, bears early and produces well. When well grown the fruit combines beauty, rich flavor and general excellence, with the keeping qualities of the Vicar of Winkfield, and often keeps later. Unlike many winter varieties, there is no difficulty in ripening the fruit with ordinary keeping in a cellar. Fruit of medium size, obtuse pyriform; skin lemon yellow, covered with small brown dots. Flesh white, a little granular, and melting, with a rich aromatic flavor. Succeeds tolerably well on the quince. Needs high culture on either pear or quince. December, January.



LAWRENCE.

McLAUGHLIN. There seems to be little doubt that this is a Maine seedling. It cannot be traced beyond the old trees on the Mc-

Laughlin farm at Beech-Ridge in Scarboro', Cumberland county, although the oldest trees now standing there are grafted ones. It was shown to the Massachusetts Horticultural Society many years ago, and was at first supposed to be the Brown Beurre.

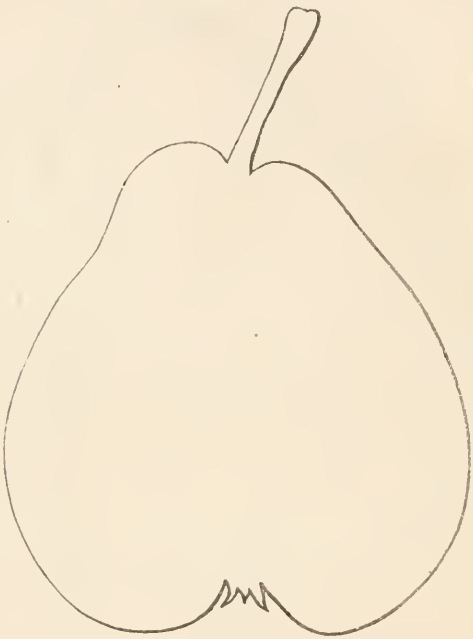


McLaughlin.

Subsequently, (about 1842,) I exhibited specimens, in December, which attracted admiration, and scions were also furnished the next spring. It has, I believe, given general satisfaction. At the last meeting of the American Pomological Society, Mr. Carpenter of New York said he was much pleased with it as a thrifty tree and good fruit, keeping into winter. The President assented fully, and said it had been too much overlooked. Messrs. Downing and Barry expressed the same opinion. The trees in Scarboro', standing in a low, undrained situation, pretty moist, if not absolutely wet, suffered severely in the winter of 1856–7; but the fact that they lived and bore well for scores of years previously, is evidence of a good degree of hardiness and general adaptation to our climate; while the price which the fruit always bore in Portland market shows the estimation in which it was there held. The fruit is a little variable, but in good seasons is unsurpassed by any other of its season, which is usually November to December.

VICAR OF WINKFIELD.

VICAR OF WINKFIELD. Worthy of extensive culture as the best cooking pear we have. When negligently grown it is nothing more than this, but with suitable treatment it can be, and sometimes is, made a very good dessert fruit. For the latter purpose, the largest possible size must be attained by severe thinning out, (connected with good culture,) and the fruit should remain on the tree as late as the middle of October; then pick carefully and put in a cool dry cellar until near the time it is wanted to be eaten; then bring them, a few at a time, into a *warm room* and keep for a week or fortnight in a closed box or drawer. By this method, although never melting nor high flavored, it is crisp and tender, perfumed, abundantly juicy, and of pleasant flavor; while its



WINTER NELIS.

coming after the autumn pears are gone gives it peculiar value. They should be eaten before becoming soft enough to be easily indented by the thumb.

It possesses qualities specially fitting it for a market fruit for cooking purposes, the tree being hardy, a great grower, an early and profuse bearer, and will bear more than almost any other without severely checking its growth or lessening materially its ability to bear the year following. It succeeds best grown on the quince. Fruit long pyriform; pale yellow at maturity. Like the

Minister apple, this fruit seems to have been named for the clergy. It was first discovered in the woods of Clion, a natural seedling, by a French curate, and is universally known in France at the present time as "Le Cure." Soon after its discovery it was carried to England, cultivated and disseminated by a clergyman of Winkfield in Berkshire county, and received his title, by which it is now most commonly known both in England and America.

WINTER NELIS. When well grown this pear, of Flemish origin, is the most delicious of all our late varieties; it needs good culture and severe thinning to get them of good size. The tree is hardy, healthy and productive, but as it is a feeble and straggling grower when grafted in the nursery, it should be grown by grafting into the limbs of grown trees, and then, with care in pruning, we may have good shaped and vigorous trees, which will bear regularly and well. Fruit of medium size, roundish obovate; skin greenish yellow, covered with dots and patches of gray russet. Flesh fine grained, very melting, juicy, and of honied richness. Middle of December to end of January.

NEW VARIETIES OF HIGH PROMISE.

The foregoing are not supposed to comprise all the desirable sorts. There is a large and constantly increasing number of new varieties which promise well, but which have not been sufficiently proved here to enable us to speak with certainty of their adaptation to the soil and climate of Maine: and yet mention of some of them should by no means be omitted. As better sorts make their appearance, the standard, by which we judge whether one be worthy of cultivation or not, rises. A sort which would have been thought very good twenty years ago, may not now be admitted as worth growing. We do not want more kinds unless they are better in some important respect. A few of the more promising of the new ones are:

BEURRE SIX. Of foreign origin. Tree vigorous and productive. Pyriform, with angular sides. Flesh greenish white, exceedingly fine grained, melting and juicy, with a peculiar and very pleasant flavor. It has fruited in at least two collections here, and may be considered hardy enough, as in both cases the trees withstood the winter of '56-7 without injury. Succeeds on the quince. November—December.

Beurre Clairgeau. Large, rather one-sided; yellowish fawn color, partially russetted. Flesh somewhat granular—juicy, sugary and vinous. Seems to be rather averse to the quince, but succeeds if double worked. Is an early and productive bearer on the pear stock. November.

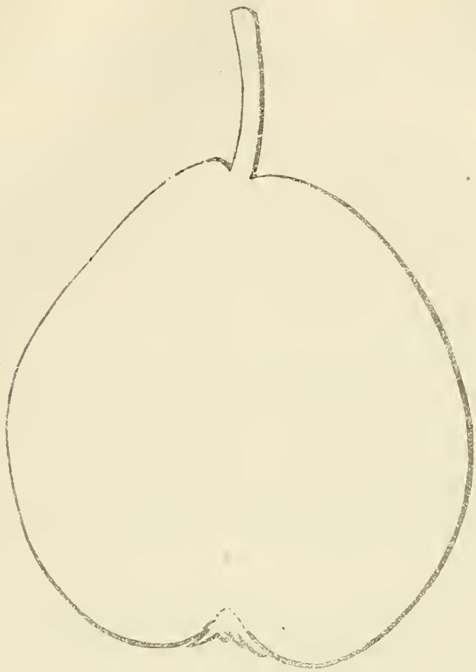
Church. Originated in New Rochelle, N. Y. Rather below medium size, roundish: yellow, juicy, melting and of very rich flavor. September. Another, named the Parsonage, which originated near it, (both on land belonging to Trinity Church,) is said to be a fine pear.

Clapp's Favorite—(*See frontispiece.*) This fruit has been disseminated the present autumn for the first time, and a large number of young trees have been sold at five dollars each. Of course, it promises well; and the prospect is good that the promise will be fulfilled. It is believed to be a cross between the Bartlett and Flemish Beauty, and to possess the hardiness of the latter. The tree resembles the latter and the fruit resembles the former, but as grown in Dorchester, where it originated, is both handsomer and better. For several years past, its fruit has been shown at the exhibitions of the Massachusetts Horticultural Society, and there is every probability that it will prove a decided acquisition.

De Tongres, or *Durandeau.* A foreign fruit, raised by M. Durandeau; of peculiar appearance and excellent. Bronze colored, with a russetty, uneven surface, and striped with red next the sun. Flesh melting, vinous, subacid and rich. Growth moderate. Said to be difficult to transplant successfully. A pear imported under the name of Colmar d'Artoisenet, fruited here this year for the first time, and more nearly resembles the above than any other, yet it appeared to be distinct.

Doyenne d'Alencon. A very late keeping pear, which has elicited high praise; medium size; russetty green.

Dana's Seedlings. Mr. Francis Dana, of Roxbury, has originated a number of very promising seedling pears, several of which have been named and lately disseminated. *America* is about as large as Beurre Diel, and is said to be preferable to it in some



DANA'S HOVEY.

respects. December. *Hovey* is of medium size; yellow, russetted, melting, juicy and very rich. November and December. Others are known as *Excelsior*, *Admirable*, *Shawmut*, and *Augustus Dana*.

HOWELL. From New Haven, Conn. Large, handsome, melting, juicy and good. October.

KIRTLAND, *or Kirtland's Seckel.* Supposed to be grown from seed of Seckel, which, in some respects it resembles. Yellowish, russetty, melting, juicy, and of aromatic flavor. Must be picked early. September.

SHELDON. Medium to large, roundish; smooth, yellowish brown, with a deeper cheek; juicy, melting, rich and high flavored.

THE PROPOSED AGRICULTURAL COLLEGE.

At the last session of the Legislature, the subject of Agricultural Education came up in connection with the question of accepting the grant made by act of Congress to endow an Agricultural College in each State. The grant was accepted; but nothing farther was decided upon; doubtless some action will be taken during the coming session.

The subject was fully discussed before the Board of Agriculture, and the result of the deliberation may be found in the resolutions unanimously adopted, as given on page 57. The report accompanying these resolves treats of the subject more in detail, and shadows forth many of the essential features of the proposed institution in so able and thorough a manner, that it seems unnecessary here to dwell farther upon it, or to recapitulate the views and arguments there presented.

The deliberations of the Legislature, aside from the question of acceptance, took little farther range than whether or not to accept a proposal made by Waterville College to the State: which was, substantially, that the donation of lands be made over to that institution, and in consideration therefor, a specified number of pupils were to be instructed at this institution, in applied chemistry, civil engineering and other branches of learning more or less intimately connected with agriculture, without any charge for tuition: and for this purpose to establish two professorships additional to those at present existing in the College. This proposal was not accepted; and, chiefly, if the reasons are correctly apprehended, because, first, the grant by Congress, *was not made to increase, or to extend the facilities for instruction in any existing literary institution*, but, in the language of the act itself, for "the endowment, support and maintenance of at least one college where *the leading object shall be*, (without excluding other scientific and classical studies, and including military tactics,) *to teach such branches of learning as are related to agriculture and the mechanic arts*, in such manner as the Legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes, in the several pursuits and professions of life." The proposal made by Waterville College, being simply *to embrace in its course of study* the branches of learning related to agriculture and the mechanic arts, and not to make these the "leading aim" of the institution, it seemed to fall short of the evident design of Congress in bestowing the grant. The second reason was, an apprehension that the agricultural features thus blended with or engrafted upon a literary and classical institution might, in time, lose their distinctness and prominence: and thus the intention of the grant be defeated through absorption into the former and prevaling aims of the college.

It is not proposed here to enter at length upon the arguments, pro or con, regarding the advantages attending an independent and wholly separate existence, or of connection with some existing institution; but only, and very briefly to offer a few suggestions.

A cursory glance at, and a thorough examination of the act of Congress, alike show, that a separate existence best corresponds to the intentions of the grant; nor can any doubt exist that the Agricultural College might be best conducted in this manner. Standing by itself, it will excite greater interest in the classes for which it is intended; will draw pupils more numerously from them, and will more readily and to greater extent raise up for itself friends and benefactors. As a separate institution it will appear more conspicuously both as the educator and the organ and representative of the industrial classes; nor will there be any peril of its being overshadowed or absorbed by any other.

The interests of such an institution would in no wise clash with those of the existing literary colleges; there would be no competition between them, save a generous rivalry to accomplish the greatest possible good: and that such a separate and independent existence would be the unanimous preference of the agriculturists of Maine there can be no doubt. But doubts do exist in the minds of some, whether it is practicable for an independent Agricultural College to be suitably maintained upon the income of the fund to be derived from the sale of the land scrip which falls to our share as a State;—and an unwillingness also exists with some, either to rely upon the voluntary benefactions of the friends of agricultural education, or to ask aid from the State. The amount which may be realized for an endowment, from the proceeds of sale, is very uncertain. Possibly, any fears of its sufficiency may prove groundless, or suitable effort may elicit private donations hereafter, to an extent sufficient to make good any possible deficiency; in either of which cases, an independent existence is practicable without State aid.

But if it must, from economical considerations, be connected with another, cannot some way be devised by which many of the advantages of a separate and independent existence may be secured? This seems possible, for although it may, in order to save expense, be put under the supervision and management of the *Trustees* of some existing institution, it may still have,

1*st*. Its own course of study and recitations, entirely separate from the institution with which it is connected, and adapted solely and exclusively to its own wants, precisely as if the connection in question did not exist.

2*d*. Although there may be some lectures in common, yet even here the wants of the pupils may be supplied by such extension of the lectures and such practical applications of the truths taught, as their peculiar circumstances demand.

3*d*. Its *Faculty* may also be distinct from the college Faculty, being composed of its own professors and teachers alone.

4*th*. It may be known distinctively, as The Agricultural College of Maine; as the Maine Medical College is known as such, though connected with Bowdoin College.

The Medical School, just named, affords a good illustration of the sort of connection which may exist with another institution, and yet retain many of the advantages of separate and independent existence, viz.: that of mere government and direction by the same board of trustees; with opportunity to avail itself of the benefit of books, apparatus, and to a limited extent, also, of the instructors of the institution with which it is connected, while *for all other purposes*, it is conducted separately.

As the act of Congress allows five years in which to "provide" the college, (reckoning, probably, from the date of approval by the President,) there remains yet three years in which to decide what shall be done and to do it. While, therefore, there is no occasion for unseemly haste, or inconsiderate action, the time is short enough for due reflection, thorough maturation of plans, and for giving efficacy to them.

It is rare that any subject of greater magnitude calls for legislative deliberation. Upon the action which this receives, depends, in large measure, not only the extent and degree to which agricultural knowledge shall be disseminated among the farmers of the State, but also the degree of progress which shall be made in all the arts of life; the future development of our untold natural resources: in a word, the productiveness of our whole domain, and its position and power as a State.

Questions pertaining to the existence, integrity and honor of our common country, and to moral health and prosperity alone take higher rank. May Infinite wisdom guide the deliberations to the best possible results.

S. L. GOODALE,

Secretary of the Board of Agriculture.

JANUARY, 1864.

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ABSTRACT OF RETURNS

FROM THE

AGRICULTURAL SOCIETIES

OF

MAINE.

1863.

EDITED BY

STEPHEN L. GOODALE,

SECRETARY OF BOARD OF AGRICULTURE.

AUGUSTA:

STEVENS & SAYWARD, PRINTERS TO THE STATE.

1864.

PREFACE.

It will be recollected that the publication of the Reports of the Scientific Survey last year swelled our annual volume beyond its usual size; for which reason the "Abstract of Returns" therewith presented was confined mainly to a tabular statement of the financial condition and operations of the several Agricultural Societies. As no appropriation was made for the continuance of the Survey the present year, it was suspended, and consequently no such reason prevents the presentation of a considerable amount of matter received from these Societies at the present time.

In view, however, of the fact that by far the greater amount of the matter so returned to this office is of minor and frequently of merely local interest, it has been thought best to supply the place of some of it with papers of greater value from other sources, which would not otherwise be accessible to the farmers of the State. Accordingly, and to a limited extent, substitution has been made, and the papers thus presented are commended to the careful perusal of all who seek for knowledge regarding this greatest of the material interests of the State and who desire to aid in its more rapid progress.

COMPILED FROM RETURNS OF AGRICULTURAL SOCIETIES FOR THE YEAR ENDING DECEMBER, 1863.

Societies.	Amount received from the State.	Amount raised by the Society.	Amount of Premiums offered.	Amount of Premiums awarded.	Offered for Live Stock.	Awarded for Live Stock.	Offered for Grain and Root Crops.	Awarded for Grain and Root Crops.	Awarded for all other objects.
Androscoggin,	$297 26	$627 99	$504 75	$346 75	$273 50	$253 50	$75 00	$33 50	$102 00
Cumberland,	400 00	2,941 35	1,232 00	1,197 00	703 00	771 00	74 00	7 00	387 00
East Oxford,	36 00	75 45	70 00	79 63	52 00	42 50	18 00	9 95	27 18
East Somerset,	58 90	296 40	163 00	110 60	88 50	76 50	25 25	11 75	14 65
Franklin,	102 01	300 00	200 00	157 75	125 00	100 20	20 40	1 00	56 20
Kennebec,	154 68	231 60	421 74	232 73	285 25	142 75	51 50	26 00	61 98
Kennebec Union,	–	252 70	463 40	253 90	277 00	162 25	–	–	79 65
North Aroostook,	200 00	269 75	199 43	144 50	116 40	48 00	47 99	4 28	48 05
North Franklin,	102 01	120 58	212 22	139 85	95 95	71 30	34 43	30 80	37 75
North Penobscot,	67 03	86 75	347 75	149 59	141 50	71 50	108 50	31 00	36 34
North Kennebec,	245 32	342 35	380 50	197 25	222 50	144 50	73 00	–	47 75
North Somerset,	77 47	110 00	171 50	138 81	111 00	86 80	23 75	13 15	18 86
North Waldo,	94 00	90 75	188 25	167 00	142 50	119 00	24 00	14 50	25 25
Lincoln,	–	377 84	425 00	344 25	247 00	166 25	55 75	33 50	144 50
Oxford,	186 38	162 70	322 50	202 40	206 50	102 50	23 00	5 00	83 90
Piscataquis,	117 70	123 40	153 33	50 24	96 50	82 50	28 00	11 00	38 00
Sagadahoc,	281 16	931 39	656 00	484 32	319 75	239 75	91 75	43 25	181 32
Somerset Central,	115 25	270 15	290 50	154 70	204 75	130 70	39 50	–	24 00
Waldo,	265 70	248 35	496 00	310 00	200 00	162 00	59 00	20 00	120 00
West Oxford,	144 60	393 15	300 00	192 15	163 25	89 25	34 00	5 00	43 45
West Penobscot,	204 46	231 94	610 40	275 25	400 50	130 50	106 90	51 00	93 75
West Somerset,	115 90	235 81	234 50	188 50	171 50	164 50	39 00	–	24 00
West Washington,	150 00	323 00	395 21	209 00	186 50	71 00	20 15	4 50	123 50
York,	400 00	802 28	700 00	474 50	270 00	214 00	110 00	16 00	226 75

ANDROSCOGGIN COUNTY AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Cattle Show and Fair of this Society was held October 6th, 7th and 8th, at Lewiston. Tuesday and Wednesday, the first two days of the Fair, were clear and pleasant, which were the days for the exhibition of neat stock and horses, and trial of strength of each, and also of speed of horses. There was evidently an increased interest in this department from last year. The show of neat stock and horses, though somewhat less in numbers, were never so good in quality. The drawing match of oxen was very interesting, and was conducted with a commendable propriety rarely witnessed on such occasions.

The leading feature of this Society is now, as it ever has been, the exhibition of neat stock and horses. Farmers believe there is more profit in rearing a good animal, than one of inferior quality. The grain crop was a partial failure in this county; consequently the show was not large.

Roots and garden vegetables were in abundance, and made a good display. The exhibition of manufactured goods was much larger than usual. Articles of domestic manufacture were quite numerous, giving evidence that the ladies have not been idle, and are bound to do their part to make our Fairs interesting. A large quantity of very nice butter and cheese was on exhibition, and was conceded by every one to be much better than at any of our former shows.

The Committee on Corn, Roots and Garden Vegetables have not reported in full, yet, but from the evidence at the Fair, in fine traces of corn, and baskets of potatoes and roots, it is believed that our farmers have received bountiful returns in the production of these crops.

Thursday, the third day of the Fair, was very rainy, thus preventing any visitors from attending, consequently our receipts were much lessened. They were greater than last year, while our expenses were about the same.

There has been a great improvement in all the departments of agriculture, in this county, within the last ten years, and it is attributable in a great measure, to these annual gatherings, and to useful information disseminated through the department of agriculture.

NELSON HAM, *Secretary.*

CUMBERLAND COUNTY, AND PORTLAND HORTICULTURAL SOCIETIES.

The Secretary reports the operations of these two Societies as follows:

"In compliance with the requirements of law, I transmit to you an account of the transactions of the Cumberland County Agricultural and Horticultural Society, and of the Portland Horticultural Society for the year 1863, of both which I am Secretary.

I will first consider the doings of the County Agricultural Society.

In February last, the Executive Committee of this Society met, and chose a Committee to confer with the government of the Portland Horticultural Society, with reference to holding a joint autumnal Exhibition and Fair. After some discussion this arrangement was agreed to by the two Societies.

The Joint Fair was held at Portland, commencing Wednesday, October 14th, and continued for three days.

The exhibition of live stock was comparatively extensive, and decidedly superior in quality. Of pure blooded animals, the show of Devon breed was most extensive, numbering nearly one hundred head. There was likewise a good exhibition of Durham stock, and a few head of each of the breeds that have become favorably known in our State, and in New England generally, for their various excellencies, as farm stock. There was also a goodly show of the various crosses of neat kine, which have obtained popularity in our State; but no information, through the statements of exhibitors or otherwise, with reference to the productiveness of the animals, or their tested excellencies in any way, has reached me that would be of interest to the agricultural portion of our State.

The exhibition of horses was very fine, and would have been creditable to a State Fair! But in this department nothing was elicited in the way of information, that would be of practical value to the farmer or grazier.

The exhibition of sheep, swine and poultry, was, as usual, far from being large. And yet, I think the exhibitions of the Society, and the amount of money expended for premiums, have had a tendency to improve our farm stock greatly in every department. Twenty years ago (I might truthfully say fifteen years ago even) it was rare to see more than one or two pure blooded animals of the several bovine breeds at our exhibitions. But almost every farmer in the county, who makes any pretensions to good farming, has his favorite full blooded Devon, Ayrshire, Durham, Hereford or other breed cow, not to forget what is called our native breed—or prized grade yoke of oxen.

The exhibition of farm products, manufactured articles, fruits, plants and flowers, well filled the large City Hall of Portland, and was highly interesting. Herein I think, are the beneficial effects of the operations of our county and local Society, particularly manifest. Perhaps not so much in regard to the raising of corn and the cereal grains, can this be said, but the statement will apply with much force to the raising of vegetables, and the growing of fruits, particularly apples, pears and out-door grapes, as well as grapes under glass. But no statements have come into my hands, respecting these products, which would be of value for publication.

The Porland Horticultural Society held a spring and summer exhibition, in addition to the Joint Fair, when about sixty-five dollars was awarded on plants and flowers.

The whole amount of the premiums and gratuities awarded at the Joint Exhibition, was one thousand one hundred and one dollars, ($1,101.)

S. B. Beckett, *Secretary.*

FRANKLIN COUNTY AGRICULTURAL SOCIETY.

Secretary's Report.

The leading feature of our Show this year was the sheep, which were the best ever shown in this county, if not in the State. Those exhibited were mostly Spanish Merinos, of which there were about one hundred and fifty, mostly full bloods, with a few high grades.

There have been over one hundred full bloods brought into this county within the last eighteen months; some bucks at a cost of $250, which shear twenty pounds of wool; also ewes at the price of $100 to $200, which shear from twelve to fifteen pounds, and rear lambs.

J. M. Bass of Farmington, recently bought one buck and two ewes of Mr. Hammond of Vermont, at a cost of $750. Mr. Bass has a flock of fifty ewes which sheared last June ten pounds each; these are two full bloods, the others are seven-eighths and fifteen-sixteenths Spanish. There are many other good flocks in this vicinity, among which are those of H. F. Weymouth, William Niles, William Woods, J. F. Woods, J. W. Green, L. T. Green, J. Titcomb, J. C. Phillips, H. Clark.

I think there are one thousand sheep within three miles of here that will shear from six pounds to twenty pounds next June.

I am aware that these figures look large to some who are used to keeping the long-legged coarse-wooled sheep and getting from two and a half to three pounds per head; but if they will just give us a call we will soon convince them.

These sheep are very compact in form, being short-bodied, round-ribbed, short-legged, thick built, hardy constitutioned sheep, well adapted to the hills of Franklin county.

The show of oxen and steers was not so large in numbers as in some former years, but what they wanted in quantity they made up in quality, rarely seeing so many well matched oxen and steers at our Show.

The horse department was well filled, especially with trotting horses. Good judges say it was the best trotting ever on the track.

The display of fruit was excellent, but not as large in quantity as it should have been, as Franklin county is a great fruit-growing county.

Had our Show been later in the season we probably should have had a larger show of young stock which had not then returned from the back pastures.

The corn crop in this county is above an average; wheat about seven-tenths of a crop—the weevil and rust having caused loss; oats and barley a fair crop. Potatoes have suffered to the extent of a third from the disease. Turnips, beets and carrots are not much grown as field crops.

L. F. Green, *Secretary.*

KENNEBEC UNION AGRICULTURAL AND HORTICULTURAL SOCIETY.

Secretary's Report.

This Society held its Second Exhibition in Gardiner on the 6th and 7th of October.

The show of neat stock was somewhat diminished in numbers from some former Shows held on the same ground. Notwithstanding the heavy drain for the supply of the market at home and abroad, it fully sustained its former standing in regard to character of the specimens presented. The working oxen brought to trial were of superior order; the contest was well conducted, and some of the best examples of what good oxen, well trained, are capable of performing, that has ever been witnessed in this vicinity, was exhibited. The dairy stock and products were fair in amount, and contained some excellent specimens of both.

No premiums having been offered for speed, the horse department was not so crowded as on some such occasions. A few superior animals were on exhibition. Amongst other good animals may be mentioned the four years old owned by F. A. Plaisted, the three years old by John Osgood, both of Gardiner, the six years old stallion of S. L. Plummer, a finished animal in form and action, wanting only in size—these and others deserve a more extended notice than given them by the Committee.

There was a small representation of sheep. A few of the leading breeds were on exhibition, but none possessing uncommon merits.

Mr. Hurlbert, as usual, and almost alone (but one competitor) carried off the honors and prizes in the swine department. His Prince Alberts and Chesters were so much in favor as to receive constant and repeated visits during the Show.

In the fruit department, the increased number of varieties of pears, plums and grapes was a more distinguishing feature, than the amount of fruit on exhibition. In nothing is there more decided marks of progress than in the attention given to fruit culture. Increased attention is given to planting and caring for trees, and procuring choice varieties. The cultivation of small garden fruits is rapidly extending, and at the present rate of advance every owner of a few rods of land will soon be able to supply his table with these wholesome luxuries from his own soil.

There was a lamentable deficiency of agricultural implements and other mechanical products. Taking into the account our location and the amount and variety of manufacturing carried on in the immediate vicinity, it might be expected that this Society would take the lead in the State. Our mechanics excuse themselves for failing to contribute even their usual amount of the produce of their labor, for the reason that there has been so great a demand for them that they had "nothing on hand to contribute."

The display of vegetables and seeds was an important feature of the Show, though not exceeding, in amount, former occasions, the variety was great, and the quality superior.

The ladies were not backward in sending in their contributions. The many substantial articles of household manufacture, the rich specimens of needle work, painting, drawing, cone and shell work, &c., was creditable to them, and gratifying to the members of the Society and spectators,—minus the flowers and plants.

I venture so far from the beaten track as in this communication to notice some of the obstacles to the success of this Society, and which may be in a greater or less degree the experience of others, which if removed, would give increased interest and value to agricultural associations, and give an impetus to agricultural improvement throughout the State.

The failure of farmers to give full and explicit accounts of the processes by which they have arrived at the results which they exhibit at our Shows, and the benefits or disadvantages, profits or losses attendant, is so common, that, in many instances, the statements required by law do not contain a single valuable hint. There are honorable exceptions—they are exceptions rather than the rule.

The failure of committees to notice in their reports other deserving objects than those on which they bestow premiums often subjects them to the charge of partiality, and the Society to reproach. If adjudging committees would bestow the premiums (without favoritism) on the best articles, commend what is commendable in others, and give reasons for their conclusions, their course would be more generally satisfactory. A person who makes large contributions to the Show, of perhaps great value, and at much expense of time and travel, merely for the benefit of the concern, is not encouraged to try again, when he finds that his neighbor who has presented a single object, no part of the credit of producing it, it may be, belonging to him, has carried off the prize, and his labors of years are deemed of no account. Taking such reports as the basis of opinion, the public have a right to infer, either no objects were presented except those on which the committees have awarded prizes, or, if there were, they were not worth mentioning. There are farmers who honor their calling by such examples and such motives as intimated above. Let not societies and committees fail to honor them by a just appreciation of their efforts, and kindly acknowledgement of their favors.

Our Society (I hope it is a peculiarity) is suffering for want of the countenance and aid of the men of station, wealth and influence. Men who have the greatest interests at stake stand aloof, as though their prosperity would be undisturbed by any changes in the productive capacity of the country. Either from want of reflection that their success depends on the success of labor performed by other than their own hands, or from a willingness to see men of less means labor for their benefit, they withhold that aid which it would seem self-interest as well as true patriotism would prompt them to bestow.

I have already made so wide a departure from the course usually pursued by secretaries of the county societies in their annual communications to you, that I omit giving expression to my thoughts on a change in the practice of societies, in the application of their funds, and reserve them for some other occasion.

N. Foster, *Secretary.*

NORTH KENNEBEC AGRICULTURAL SOCIETY.

Secretary's Report.

The weather during the two days of our Show and Fair for 1863, was all that could be desired; and while the attraction at the grounds was never excelled, the attendance was larger than for several years previous. The people had been prospered; money was plenty in every man's pocket, and consequently the receipts were considerably larger than they were last year. And it is satisfactory to reflect that this increased attendance was not due to any illegitimate adjuncts; but that the people came out in large numbers to a good, old-fashioned, quiet, well-conducted Cattle Show.

There was a good exhibition of horses; and the best part of it was that the colts were better than the horses—showing that there is an improvement going on, and that the rising generation will surpass their predecessors. Maine has produced many good horses, but the end is not yet. Under the lead of such men as T. S. Lang she will do still greater things. It was gratifying to see so many colts on the ground, sired by his noble stock horse, "Gen. Knox." It showed that the farmers of Maine were alive to their interest, and were willing to sustain and encourage Mr. Lang in his attempts to improve the horses of the State.

The show of neat stock was largely in advance of any former exhibition on our grounds; and we seriously doubt if it was ever equalled in quality at any of our State Shows. Foremost in this department was the noble herd of Short Horns, presented by Mr. T. S. Lang, a gentleman whose liberal enterprise has already done much for the agricultural interests of this State, and who is entitled to the gratitude of every farmer in Maine, and every friend to the promotion of her material interests. This herd was the leading attraction of the exhibition, and its presence had much to do with our increased attendance. Hon. Warren Percival, too, a gentleman well known as a careful breeder of this same class of stock, and who is greatly interested in its improvement, had some choice animals on exhibition, of which he may justly be proud. His labors, like those of Mr. Lang, are of great benefit to the community. Very handsome herds were also presented by J. D. Lang of Vassalboro', and Simon Nowell of Fairfield.

The display of large and handsome oxen was never better—whether we consider the number or the quality.

Of sheep, too, there was a good exhibition, as was reasonably to be expected with the increasing interest in this State in wool-growing.

For once, the trotting was almost an entire failure; but this was accounted for by the proposed exhibition of the "Waterville Horse Association," which was to occur in a few weeks. This Association, composed of gentlemen in this vicinity, who are interested in the improvement of horses, has leased our track and grounds for four years; and in this connection it may not be out of place to say, that their opening Fair, this Fall, was a complete success.

The Show at the Town Hall was not large. The wives and daughters of the farmers had done but little for this part of the exhibition; for though there was a fair show of dairy products, in domestic manufactures there was a sad falling off. The show of fruit, too, was very meagre, with one redeeming feature, the exhibition of grapes by Mr. J. S. Goodwin, an amateur fruit grower, who has been remarkably successful considering his limited advantages. His show-case of luscious looking, well ripened clusters, would have been an ornament in any of our State exhibitions; and they tasted as good as they looked.

Adopting the suggestions of the Board of Agriculture, our Trustees increased the premiums on crops and the preparation of manures, this year. Our farmers and experimenters have not chosen to avail themselves of these offers, however, and there has been only a single entry in each of these departments. They also increased their premiums on butter and cheese.

On the whole, we think the farmers of this section, and the members of the Society generally, have good reason to be satisfied with their festival of 1863; especially when they consider that they have achieved all this success in a time of gigantic civil war, when they were compelled as it were, to fight with one hand, and to work with the other. They have good reason, too, to be satisfied with their labors in the field and their results. Of all crops there has been a fair yield, and prices have ruled high. The farmers of Maine were probably never so prosperous as now; and were never before so easy in their circumstances, and so comfortably situated. The high price of labor and the scarcity of help, have been the only drawbacks; and these have not seriously circumscribed their agricultural operations or diminished their profits. Let us hope that to prosperity will soon be added peace—lasting and sure—leaving us in the quiet pursuit of our honorable calling, with no baleful shadow across our path, and no disturbing anxiety for the security of our beloved institutions, or the safety of friends on the field of battle.

D. R. Wing, *Secretary.*

LINCOLN COUNTY AGRICULTURAL AND HORTICULTURAL SOCIETY.

To Hon. S. L. Goodale, Secretary of the Board of Agriculture:

Dear Sir:—In conformity to the requirements of law, I herewith transmit a condensed statement of the doings of this Society for the current year, 1863:

The Tenth Annual Show and Fair of this Society was held at Wiscasset, October 14th, 15th and 16th, 1863.

The Annual Address was delivered by S. L. Boardman, Esq. of Norridgewock.

Our Exhibition, in many departments, was quite up to the average of former years; but taken as a whole, our anticipations were not realized. Lincoln county is not strictly an agricultural county. Very few farmers cultivate crops or raise stock, other than for home consumption. The result is, we get no reliable statements of mode of culture, cost of producing, or profits realized from the various departments of agriculture. The music of the carpenter's Axe and Saw, has more charms for our people, than the cultivation of soil.

The farmer's wood-lot is another source of revenue, or bank of deposit, from which they too often *draft*, to the neglect of the cultivated portions of their domain.

Notwithstanding these drawbacks to agricultural pursuits in this county, we still see decided improvements in many departments, since the establishing of this society, proving conclusively that, although a large fund of general information may not be gathered, yet, the local benefits derived from our yearly shows, very far exceed the expense incurred. Ten years ago, but little interest was manifested in the improvement of stock; now, nearly every farmer prides himself upon his Durham, Devon, or Hereford. Ten years ago, fruit culture was a foregone conclusion; now, how changed, as our late fairs have demonstrated. Under-draining, ten years ago, was almost an unheard of thing in this vicinity; now, hundreds of acres of our best and most productive soils, by this means, have been redeemed.

At our late Fair, the show of horses and colts was quite up to our average, about thirty entries being made. To Thomas Call of Wiscasset, was awarded the Society's first premium; on entire horse, well made up, of good carriage and fair speed. (Pedigree unknown.)

Samuel Kennedy of Whitefield, for breeding-mare, Messenger stock, and preferred on account of good disposition, size and speed.

Many fine horses and colts were entered for premiums and exhibition. Among those not entered for premiums, was a span of beautiful black horses owned by Hon. R. H. Tucker of Wiscasset, which attracted much attention, and were admired by all connoisseurs of good horses. A Scotch pony, imported by Alexander Johnston, Esq., of Wiscasset, came in for a large share of notice, and fairly merited the encomiums showered upon him.

Of working oxen there were ten yokes, single entries, and two town teams; one of eleven yokes, from Newcastle, and one of eight yokes, from Wiscasset. They were noble teams, and a credit to the towns producing them. They were made up mostly of grade Durhams and Natives.

But few entries were made of bulls. Those exhibited, were of superior make, and will be no detriment to the improvement of stock. Edward Houdlett of Dresden, received for pure Jersey bull, first premium. H. P. Cotton, Nobleboro', pure Durham. Isaac H. Baily, Alna, Devon.

Cows and heifers were very fairly represented, and of excellent quality.

From all we can learn in regard to stock raising in this county, we find that the Durham and grade Durham have a large preponderance over all other breeds. One reason assigned is, that this breed have better constitutions, will do more work, and are kept at less expense than others; another, that although less milk is obtained from the same keeping, yet the quality more than makes up the deficiency in quantity. For stock for beef, Ayrshires receive the preference.

Sheep, Swine and Poultry. In this county sheep raising has largely increased within a few years, although until quite lately there has been but little improvement in breeds. With cotton cloth from five to eight cents per yard, sheep, in this region, were at a discount, except for slaughter; now that fabulous prices are obtained for that article, our people naturally look about them for a substitute, and sheep step in to furnish their share of what every one must acknowledge to be a very excellent substitute for "Dixie's product."

This department, we think, should receive more encouragement from our Agricultural Societies than has heretofore been awarded it. Our first premium on buck (English) was awarded to Jeremiah Erskine of Alna. Second, to William Taylor of Wiscasset (Leicester). Collins Carlton of Alna, best six sheep, (Native). William Taylor, second best six sheep, (Leicester). There were placed upon exhibition, by Alexander Johnston, Esq., of Wiscasset, one imported buck and two ewes—a cross between the Cheviot and Leicester—fine looking animals they were, and attracted much attention from all interested in sheep raising. To Mr. Johnston the thanks of this community are due for the interest he has taken in introducing pure blood sheep into this county.

There were several entries of swine, all in excellent condition. Of the different breeds, the Suffolk and Leicester are generally preferred.

Turkeys, geese, ducks and hens were exhibited in abundance, causing all epicures who examined them to regret that Governor Coburn's Thanksgiving was not appointed at an earlier day.

Dairy Products. This department was meagre indeed; six entries only, of butter, and none of cheese.

Field Crops. Lincoln county does not seem to be well adapted to the cultivation of corn. It is a rare thing that a good crop of corn is raised in this region. Whether the cause is to be found in the soil, climate, or mode of cultivation, I am unable to decide. Occasionally a farmer raises a large crop, well ripened; this, however, is the exception and uot the rule.

The barley crop we judge to be the one best adapted to this locality, from the fact that it is more extensively raised than any other, and with better success. There have been shipped from this port alone (Waldoboro') about eight thousand bushels within the past four weeks, and this, I have been informed, is less than has been shipped from several other places within the limits of this society.

The oat crop is not neglected in this county, being second only to barley. Several samples of beans were exhibited ; none requiring especial note, except those raised by D. H. Dunton of Whitefield—the variety was not known to the exhibitor, but he did know that they were extremely prolific, he having raised ten bushels from four quarts of seed.

Root Culture and Garden Produce. This department was fully represented. The potato crop is one to which much attention is given in this county, it paying quite as good a percentage for the outlay of labor and expense in cultivation as any other. The varieties known as Jacksons, Orono and Snowballs are preferred, they being less liable to the scourge of potato rot than most others. William Kenniston of Boothbay, received the first premium on variety known as Orono. E. G. Peasley, Alna, second premium, Snowballs. H. P. Cotton of Nobleboro', exhibited the greatest variety of garden produce. E. R. Kaler, 2d greatest variety.

William Blunt of Wiscasset, takes the palm on raising onions, he having raised 14 bushels on two rods of land. Soil, clay loam, well manured with compost manure.

The squash tribe were well represented ; the variety known as Hubbard ranking best, from the fineness of its grain and excellence of flavor. Beets, turnips, carrots, cabbages and pumpkins came in for their due share of notice, but nothing of general interest was elicited from their exhibitors.

Fruit. The Committee on Fruit report, that, although the exhibition in this department was not by any means so extensive as could have been desired, yet the various samples are of excellent quality, and highly creditable to those who presented them. The small show in this department, is attributable in part to the unfavorable character of the past season.

The show of pears was larger and much better than any previous one, which is highly gratifying and shows conclusively that notwithstanding our cold winters, this delicate and delicious fruit can be raised in this county.

Dr. Moses Call of Newcastle, exhibited thirty-three varieties which were very fine, and shows that we need not be dependent upon Massachusetts for the gratification and enjoyment of this fine fruit, but makes the thing certain that the soil and climate of Lincoln county are adapted to the culture of this, one of the most delicious fruits of our country.

Thomas Herbert of Bristol, exhibited twelve varieties of pears, and a fine collection of grapes.

For winter apples, the Baldwin receives the preference in this county, for fall apples, the Gravenstein and Jewett's Fine Red.

James Taylor of Wiscasset, exhibited twelve varieties of fall and winter fruit. Col. Thomas Simmons of Waldoboro', exhibits thirty-one varieties of apples, four of pears, and one of plums. Many other samples of apples, pears and grapes were exhibited, all of which were creditable to the producers. The several departments comprising native wines, flowers, carriages and harnesses, Agricultural implements, were well, and that of household manufactures largely, represented. Each received their due share of notice from the awarding committees and visitors.

In the miscellaneous department we find something new to fairs in this county, and consequently not provided for in our list of premiums. Moses Greenough of Edgecomb, placed on exhibition samples of tobacco of his own raising, and cigars, which would compare favorably with those of foreign manufacture. Mr. Greenough is of the opinion, that tobacco culture in Lincoln county may become (by proper application) a source of revenue to the cultivator, exceeding that of any other crop now raised; whether or not this is so, will be proved in coming years.

Alexander Johnston of Wiscasset, exhibits specimens of prepared *rockweed*, for a general fertilizer. It is first dried, then ground or crushed. It is believed to be a most valuable manure, and possesses five to eight times the strength of the green weed. Mixed with fish guano, it forms one of the best and cheapest of dry marine manures. That rockweed possesses excellent fertilizing qualities, has been proved in many instances; and we trust that Mr. Johnston's experiments with this may prove successful, and the farming community benefitted thereby.

C. C. Atwell, *Secretary.*

Waldoboro', November 15, 1863.

OXFORD COUNTY AGRICULTURAL SOCIETY.

The Secretary says :—" The Annual Fair of the Oxford County Agricultural Society for 1863, was held at the Society's grounds, on the 7th and 8th days of October.

On Wednesday, the first day, the weather was favorable, and a large collection of neat stock was exhibited, which was an honor to the county. A continued improvement in neat stock is manifested at our fairs.

The number of horses presented was not so large as at some previous fairs; but, notwithstanding this, some noble animals were exhibited. The number of sheep and swine on exhibition was also less than at former shows, but some fine specimens were to be seen. The exhibition of fruit was large and of a fine quality. A very great improvement in the quality of apples has been made, and the crop was large in this vicinity. It is the opinion of farmers and dealers in fruit, that not less than six thousand barrels of apples have been put up in the town of Norway the present year. And yet the crop might be doubled.

The crop of corn was good, but wheat, rye, barley and oats have not produced crops so large as those of last year.

There was only one entry for a crop of corn, and one for barley, both by the same person.

There was one entry for a crop of oats, but no statement has been received.

There were no entries for crops of wheat or rye. Numerous specimens of seed corn, wheat, barley, peas, beans and flax seed were exhibited. Root crops have not been so good the present year as for several previous years. There was but one entry for root crops, and that was for a crop of potatoes. I received a statement giving the area on which the crop was grown, and the amount of the crop, but no statement of the method of cultivation, or the amount of manure used. It was consequently inadmissible.

The display of garden vegetables was good. There were twelve entries for butter and cheese, nine for bread, and two for honey. The exhibition of agricultural implements, of domestic manufactures, needlework, &c., was a credit to the Society.

On Thursday, the last day of the fair, we had a rain storm and consequently a smaller number of visitors. And as our principal means of raising funds has been the sale of tickets of admission to the fair grounds, our fair of the present year has failed to produce a sum sufficient to pay the current expenses of the Society, consequently the debt of the Society has been increased more than the amount awarded for premiums. On the first day of our fair, there was a town show in an adjoining town, where the people were so liberal as to give a dinner to visitors, to induce people from a distance to attend their fair.

Now, if those people continue such liberality, and continue to hold their fairs on the same day of ours, it will materially affect our receipts.

EAST OXFORD AGRICULTURAL SOCIETY.

Secretary's Report.

I herewith submit the following report of the doings of the East Oxford Agricultural Society, for the year ending December, 1863:

This Society being yet in its infancy, and the funds of the same somewhat limited, as the financial statement herewith transmitted indicates, the Trustees, at their annual meeting in January, thought it expedient to limit the number of premiums offered, to one for any one kind of article offered. Accordingly, no second premium was offered. There was, however, discretionary power, to a limited extent given the committees, to award gratuities, when, in their judgment, the article presented approximated so nearly to the article which drew the premium, that justice should seem to demand it. In some instances, where premiums were offered, no competitors appeared; and in other cases, gratuities were awarded where no premiums were offered. Many of the animals presented to this Society for premiums are of Native stock, some of which, not being raised by the applicants, they are unable to give an account of the actual expense of raising; while others assert that the *extra* care and expense is so trifling that a fair statement would show no difference between that, and the expense incurred in raising ordinary stock.

The Annual Exhibition of this Society was held at Rumford Corner, on the 14th and 15th of October last, and was well attended; and I think, considering the infancy of the Society—this being the third exhibition—the entries made by competitors will compare favorably with other societies in this part of the State. The discipline of some of the working oxen was particularly creditable to their owners.

A beautiful stock horse was entered by Mr. James M. Brown of Rumford, "Flying Black Hawk." He was sired by the Baldwin Black Hawk, Baldwin by the original Black Hawk, or Thurston horse. His dam was a full blood Morgan mare, sired by old Sherman Morgan. He is ten years old and was raised in common with other colts until two years old, after which he was put to light driving and better feed, which consisted of four quarts of carrots per day the first winter, afterward kept as other stallions in general. I valued him at fifteen hundred dollars. The best two years old colt was raised in Bethel by J. Estes. Sired by Rising Sun. The dam is of Morgan descent. But one entry of sheep was made. These were sheep raised by Mr. D. D. W. Abbott. He has his lambs come late enough to avoid exposure to the cold weather so common the last of March and first of April, turns them out to pasture as soon as there is sufficient feed, salts them once a week during the summer, gives them a warm place in winter, and feeds on good English hay, sometimes a few beans, or other provender. The pasture is upland with plenty of sweet feed. He thinks the cost of raising will not exceed two dollars and fifty cents per head.

Premiums were awarded on potatoes for 276 bushels per acre; on wheat, for 43½ bushels on two acres; on Indian corn for 85 bushels of ears.

The principal crops grown within the limits of this Society, are Indian corn, rye, oats and potatoes. Very little wheat is raised except on burnt land and upland. Barley is also raised in considerable quantities at the present time.

It seems to be the prevailing opinion of farmers, that their labors are bestowed upon too much land, consequently lessening the profits on the amount of labor bestowed. One man will raise a larger crop on an acre of land, than his neighbor will on an acre and a half of the same kind of soil. Instances of this kind have come under my own observation. The cause is obvious. Better care and more labor is bestowed upon the same amount of land and yet not so much on the acre as on the acre and a half. The result is, that labor and the use of the half acre of land is thrown away and the crop diminished. One gentleman informed me that in ninety days from planting, he harvested and carried into his chamber a good crop of sound corn. This is considerably sooner than is common among farmers in this section. His method was as follows: Spread a good coat of manure on grass land, and turn it under. Then harrow lengthwise of the furrows until mellow,—never harrowing crosswise—mark out the rows, and deposit in each hill a table spoonful of ashes and plaster; after which drop and cover as usual. His theory is, that the ashes and plaster warm and nourish the corn until it has attained sufficient growth to drive its roots to the manure below, which, added to the sward which is by this time decomposed, furnishes sufficient nourishment for the corn until harvested.

O. W. Blanchard, *Secretary.*

NORTH PENOBSCOT AGRICULTURAL AND HORTICULTURAL SOCIETY.

SECRETARY'S REPORT.

The Cattle Show and Fair were held at Lincoln Center, October 7th and 8th, 1863.

The first day was very fine and the display in most departments very good, especially neat stock. The second day was very wet and uncomfortable; preventing the attendance of many with their horses and colts which are exhibited on that day.

Dairy products were of the first order, excelling in quality and quantity any former year.

Show of fruit very meagre.

The vegetable kingdom generally, was pretty well represented. On the whole, the show was very creditable, surpassing in interest several previous years.

No one department of the Society excites so much interest as the drawing of oxen and horses. Crowds gather around, vociferously exulting in the success or defeat of friends or foes. And we presume that North Penobscot, in this respect, is not alone. Although this, in a measure, must be indulged in and allowed, yet its real utility is very doubtful.

The Society, at the suggestion of the Board of Agriculture, and desirous of directing the attention of its members and the farming community generally, to the more important *departments* of Agriculture, have offered very liberal bounties on crops, especially Indian corn, which usually is very much neglected.

Hon. Wm. R. Hersey of Lincoln, raised 175 bushels of ears on one acre; using fourteen dollars' worth superphosphate of lime. Rows three and a half feet asunder, hills one foot; hoed three times. Thinks this fertilizer of great advantage, and intends going into it more extensively in future.

Shepard Bean of Lee, applicant, on one-half acre with only common dressing, raised sixty-one bushels ears, three bushels white beans, and one cart load pumpkins. Rows three and a half feet, hills two feet, hoed twice, weeds extracted by hand and carried off. Corn, twelve rowed variety, Kenneebe seed.

On account of drought the hay crop suffered materially, averaging in some localities no more than half a crop, obliging many of our farmers to dispose of a part of their stock.

Wheat. Individuals have raised from twenty to thirty bushels per acre; but the majority has been a failure. On inquiry, we find success has attended those who have sowed early and sowed the Red Sea variety; while others, sowing different seed and late, have failed; averaging not more than from two, to four or five bushels per acre.

Oats, barley, rye, buckwheat, &c., average about a middling crop.

Corn. Those who have planted with a determination to raise a crop have, in every instance, succeeded; while those who have failed (and there are some such) have only to blame the *culture* not the *soil* nor *season.*

Potatoes. Crop surpasses last year, although some infested with rot; many have raised an abundance, and all comfortably supplied with this indispensable article and of very excellent quality.

Beans. At present prices no crop is more remunerative; while all have a supply many have a surplus. One instance I will name: Eben Averill, Esq., of Prentiss, the present season has raised over two hundred bushels, valued at two dollars and a quarter per bushel. (He certainly is christened Deacon for life.)

Flax. Although but few have engaged in it, many intend to, and ere long, we presume, it will become an object of interest, supplying the place of other fabrics, now so enormously high.

Among many other valuable things, Mrs. Charles Brown of Carroll, presented at the fair a piece of tow and linen cloth, containing some seven or eight yards, manufactured with her own hands, firm and durable, reminding one of years gone by, when boys (farmers' boys we mean) were clad in working suits of the same material. Also one pound of linen thread very even and nice.

As yet the North Penobscot Society is a movable one. Efforts have been and are making to locate; and embracing so much territory is a difficult question to decide; still, there is no doubt could it be done judiciously and fairly, it would be of great interest to the Society. Suggestions from abroad might assist very much to settle the matter.

Sheep husbandry is claiming the attention of our farmers. New and improved breeds are being introduced, and a determination is manifested to at least manufacture our own cloth, having heretofore fallen very far short of it. One discouraging feature still remains, wolves and dogs. Within the past week we have lost from our flock five nice sheep by wolves. Some few years since we lost twenty-seven in one season. But still we shall keep trying.

SHEPARD BEAN, *Secretary.*

WEST PENOBSCOT AGRICULTURAL SOCIETY.

SECRETARY'S REPORT.

The West Penobscot Agricultural Society held its Annual Exhibition and Fair at Dexter, September 29 and 30, 1863.

This in many respects is superior to any former exhibition; the weather was fine, and a large gathering of people lost none of its enjoyments.

The show of oxen and steers was excellent, showing a decided improvement in this department. Cows, heifers and sheep were not so well represented as last year, although some fair specimens were on exhibition. The show of horses, colts, bulls and swine was very good. Most of the neat stock were grade Durham, Jersey and Devon, the sheep principally grade French Merino, and the swine of pure White Chester, a mixture of Chester, Suffolk, Newburywhite and Tuscarora. A fine pure bred Jersey bull four years old, also several specimens of grade Jersey yearlings and calves, were exhibited by M. E. Rice, Esq., of Stetson. A few fine specimens of fowls were on exhibition—"Bolton Greys" and "Silver Pheasants."

The remaining part of the Exhibition was held in the Town Hall. This hall, one of the most commodious in the county, was splendidly decorated with flags, paintings and engravings by the good people of Dexter, making the occasion very pleasant to exhibitors, as well as to the many visitors during the two days.

The fruit exhibited, consisting of apples, pears and grapes, excelled any former show, the improvement consisting in a greater variety of winter fruit, among which were the Black Oxford and Ribstone Pippin. The Committee remark: — "When the quality of the fruit, and the hardihood of the tree, of these varieties, are understood, we have no doubt they will be introduced by fruit growers generally. The great object to be gained in fruit raising, is not unlike that sought in the culture of grains and vegetables, that is, profit. Hence those varieties of fruit which will yield the largest profit from the least expense, are those which should be encouraged, and to a great portion of the exhibitors of this Society we would say, *encourage the winter fruit.* In localities near market, the earlier varieties of fruit may be cultivated with profit. But in places at a distance from market, aside from a quantity of fall fruit for home consumption, there is no profit in raising it."

The show of vegetables was good, the largest and best assortment, with a nice lot of onions, grown by E. B. Stackpole, Esq., of Kenduskeag, attracted much attention. Butter, cheese, honey, maple sugar, jellies, preserves and wine were well represented.

The exhibition of domestic manufactures and needle work, paintings, cone-work, and fancy articles, joiner's work, boots and shoes, was very large and fine. The articles made of the best materials, the skill and ingenuity displayed in their manufacture, are deserving of much praise. In addition to the interest manifested in this department by the ladies, splendid varieties of beautiful cloths were exhibited by Messrs. A. Abbott & Co., and by R. W. Robinson, Esq., from their factories in Dexter—demonstrating the fact that there is no necessity for going abroad for goods, while such beautiful fabrics are manufactured at home.

Crops exhibited were very good. A large list of entries were made, while for some unknown cause, more than one-half failed to make their statments in season for the Committee. I am satisfied that the crops, as a whole, were never better than the present year in this vicinity.

An address was delivered before the Society on the second day of the Fair, by their President, Ezekiel F. Crane, Esq., at the close of which the occasion was enlivened by beautiful music discoursed by the Dexter Brass Band.

Forty-one new members were obtained during the two days, and the prospect for the future certainly looks more promising.

Respectfully submitted,

T. P. BATCHELDER, *Secretary and Treasurer.*

PISCATAQUIS COUNTY AGRICULTURAL SOCIETY.

Secretary's Report.

Our Annual Fair was held at Dover, October 7th. The second day proving very rainy, it was thought advisable to close the Exhibition, as the main and principal interest was had the first day. But subsequently the Society thought best to display the speed of horses, and the exhibition was renewed on Thursday of the following week with general satisfaction to all present.

The Exhibition was attended by a very large proportion of the citizens in the county. And while the Society numbers only one hundred members, yet there are double that number of eminent farmers, who attend the show and manifest much interest in the many improvements in the several departments of agriculture, and thus are very much benefitted by the knowledge and best breeds of stock brought within their reach, and yet withhold their aid and influence, and so receive its benefits at others' expense.

Our last Exhibition was very satisfactory to the Society; the best in the excellency of the stock for many years, especially the oxen and steers. The younger animals were less numerous, as were the sheep and swine. The department of horses and colts an average.

The past season with us was very wet, increasing very much the expense of cultivating root crops; but giving good crops of hay, though the season of cutting was somewhat later than usual. It was generally secured in good condition.

The several grain crops were *fair* except wheat, which was not over half a crop. Corn was excellent; though the prospect was bad the first half of the season. Potatoes suffered from rust in some localities, yet the crop was an average. Fruit crop much less than last year, though plenty for home use.

Grazing was good, and the stock comes to the barn in unusually good condition, considering the condition of the country and the excitement of the people, with the anxiety for friends in the army, together with the large drafts made upon the people in support of the war, while seven-eighths of the soldiers are taken from agricultural pursuits, this Society has held its own in point of numbers and interest, and our nation must acknowledge that it is through the influence of the agricultural societies in the north, that the *granaries* in the land are filled to overflowing in this time of her greatest need.

LYMAN LEE, *Secretary.*

SAGADAHOC COUNTY AGRICULTURAL SOCIETY.

Secretary's Report.

The Sagadahoc Agricultural and Horticultural Society now embraces two hundred and eight members, seventy-five being added the past year. At the annual meeting of the Society in 1862, an alteration was made in the by-laws as to what should constitute membership, which will explain why the number of members now reported is less than in former years, having begun as it were anew. And we find by the change that the members are more interested in the welfare of the Society.

Our Annual Exhibition was held upon the Society's grounds, Topsham, October 13th, 14th and 15th, all of them favorable days, which induced a much larger attendance than usual, especially the last day.

The show of stock was remarkably good. Of oxen and steers there were fifty pairs, all well matched in shape and color, and a large portion of them were very superior, showing an improvement from the last exhibition; and when we consider that the largest portion of them were exhibited by the farmers of Topsham, and by farmers not more than five miles from the grounds, how much larger and more interesting would be the exhibition, if the farmers in the towns of Brunswick, Bowdoinham, Bath, Richmond, and the other towns in the Society would generally bring out their teams, for we had evidence that they had good teams, from the few specimens that the most enterprising farmers of some of the above named towns exhibited. Especially worthy of mention were the three yokes of steers by Mr. G. L. Berry of Georgetown, perhaps the most distant farmer in the Society. Of cows and heifers thirty-four were exhibited from the towns of Brunswick, Bowdoinham, and Topsham, many of them very good animals. Farmers in this vicinity are not partial to any particular distinct breed; the larger portion of those exhibited were Durham grade. Some Devon stock was to be seen, and one full-blooded Ayrshire heifer, which I had not the pleasure of examining, was presented by S. S. Wing of Brunswick, who also had a fine Ayrshire bull.

The number of horses and colts was not large, but as good or better than usual. The raising of horses in this Society is rather limited, as it is thought that other stock pays better.

The number of sheep was much larger and the quality much improved. Our farmers are trying, and with success, to improve their sheep by the introduction of full-blood bucks, and in some few cases full-blood ewes, of the Southdown, Oxford Down and Spanish Merino breeds; and their statements show that they are on the road to prosperity. Wool growing is now considered a very profitable business of the farmer, more especially in these days of high prices; but should the price of wool fall fifty per cent. to-day, my impression is that the farmers would keep their usual number of sheep.

In crops we have made a decided advance since the organization of the Society, both in quantity and quality of the articles raised, and by the statements given are enabled to compare notes, although many of the statements fall very far below the requirement of the statute, still we are thankful for the little information we are enabled to gather from them. Many of the statements, I trust, will be found full, faithful, and instructive, and now that competitors begin to understand what they are required to do in filling up blanks furnished for that purpose an improvement may be looked for. We had on exhibition good samples of corn, mostly of the Dutton variety. The crops of corn in this section were good, it will be observed by the statements some were very extra, say from seventy-five to a hundred bushels per acre. Grain was rather below the average as to yield and quality, owing to the extremes of wet and heat. Root crops were good. The show of vegetables was not as large as we have sometimes had on exhibition, but the specimens were fine. This part of the Exhibition is generally left to those living near the Fair, on account of the heavy transportation; but it would be very gratifying if a few in every town in the Society would make an effort to add something from their gardens; that the large room devoted to vegetables might be full—for our farmers are famous in raising good vegetables.

In the center of the apple hall might be seen a very good show of fruit, mostly apples, but some good pears and fine grapes, a good exhibit for the somewhat unfavorable season; but it has been suggested that they were without names—that they looked good, but we were left to guess at the kinds. This ought not so to be; an improvement in that respect is desirable. "A word to the wise is sufficient."

Around the walls of the same room the ladies had arranged a good show of articles of their workmanship and skill, and in good variety. I have often heard the remark made that the ladies of this Society showed unusual skill, not only in needle-work, but in the manufacture of household fabrics of cotton and woolen which, as far as my observation extends, is correct. I have never seen better anywhere.

We had in the agricultural implement department, Manning's mowing machines, that need only to be tried to be liked. They will suit any farmer if not thoroughly wedded to the old way of cutting hay while the dew is on. Improved horse rakes, some of them produced in the Society, and two or three varieties of plows were successfully used upon the grounds during the Fair, portable cider mill, washing machine, &c., &c. In a word, every branch of agriculture, and many of mechanics, have received and are receiving benefit from the operations of this Society.

We have been laboring under quite a disadvantage by the small trotting course; but since the Fair, the Society has purchased sufficient land adjoining to make a good half mile course, which at this time is nearly completed, and will be ready for use at the next Fair.

The success attending our labors to have a good exhibition the present year is complete. With a large attendance, we had an increasing interest manifested by all classes; and last but not least in importance, very large receipts; and we can truly state that our Society never stood so well in the community, and there appears to be a determination that the Sagadahoc Agricultural and Horticultural Society shall succeed, and be a blessing to all classes and trades.

The past season has been peculiar, and very unusual say from the beginning of the year. It was feared that in consequence of the bare winter, and great depth of frost in this vicinity, that the grass roots would be much injured, and with good reason, and which proved true. The winter was followed by a late and wet spring; consequently farmers were late in planting and sowing.

It was immediately followed by a dry May and June, causing vegetation to look sickly and dreary; but the moisture and heat of July, at once changed the appearance of fields and crops, and the prospects of farmers. The hay crop was, upon the whole, about 25 per cent. less than the year 1862, and grass fields have fully recovered from the winter-kill of 1862–3.

Grain suffered from these extremes very much, particularly from wet and heat. Some varieties of potatoes were diseased, the Chenango in particular was a complete failure. The crop of potatoes, although small, is of good quality and brings good prices. It will be borne in mind that the towns composing this Society are not strictly agricultural towns, some of them, in fact, wholly engrossed in other pursuits, and that the labors attending the management and success of agriculture devolves upon a few; and where little is given much will not be required we trust; but we will cheerfully endeavor to do our part in the great work, in promoting Agriculture and Horticulture, so far as is in our power by the blessing of Heaven.

The principal crops grown are hay, potatoes and grain for market, and corn for home consumption. The main object of the Society is the improvement of agriculture and the agriculturist, and I think it is very evident that some steady progress is being made yearly, and that our farmers are more enlightened, and they are looked upon with more favor by all other professions.

The subjects of draining, mixing of soils, and the conversion of muck of swamps and low places into fertilizers, are agitating the minds of our farmers; many of them, as will be seen by their statements, are busily engaged in such improvements, and with great success, and the interest is increasing in these subjects, and in agriculture generally.

Very respectfully,

ISAAC P. TEBBETS, *Secretary.*

SOMERSET CENTRAL AGRICULTURAL SOCIETY.

Secretary's Report.

The Somerset Central Agricultural Society, held its Annual Cattle Show and Fair, on the Society's grounds in Skowhegan, on Tuesday and Wednesday, September 22d and 23d, 1863. The first day of the Show was uncomfortably cold, which undoubtedly made the gathering of "men and beasts" much smaller than it would otherwise have been; but notwithstanding the inclemency of the weather, there was a good show of stock on the ground, especially of oxen. There being a large demand for oxen, for lumbering purposes in this locality, much attention has been given to the rearing of this kind of farm stock. The old-fashioned native breed oxen, which a quarter of a century ago were considered good enough to work, as they were tough and smart, do not answer the purpose now. Large, well-built oxen, fat and sleek, are sought for for work or beef, and none other need apply. Hence almost all of the oxen within the limits of this Society are improved breeds, principally grade Durhams, with here and there a Hereford.

More improvement has been made in neat stock by the introduction of Durham blood than by all other breeds put together; although there are but few thoroughbreds amongst us. Some efforts have been made the past year, to introduce some thoroughbred stock animals of this kind, and we hope the effort will not be abandoned. In the efforts being made to raise fine oxen, we think the equally important matter, that of raising good cows, is very much neglected. Thus while we have a fine collection of superior oxen and steers on exhibition, we have but very few cows and heifers. In the rearing of oxen too much attention is given to the sire and too little to the dam. Were more attention given to rearing cows, equally as good oxen might be produced, and cows brought up to a very much higher standard of excellence. The dairy products of the cow should be a subject of improvement, as well as her stock properties; the dairy should not suffer at the expense of the ox team.

The exhibition of horses, especially breeding animals and colts, was very good: and notwithstanding the continual depleting of the horse stock for the army, there seems to be a plenty more left. The prominent qualification for a horse to possess in this locality, and among what are called horsemen, *is speed*, and possessing this, whatever else he may be deficient in, he belongs to the horse aristocracy; much attention is given here, as well as in other parts of the State, to the breeding of fast horses, and many are annually taken from the farm, and trained upon the trotting course, until they can show commendable speed, and then find a market amongst turfmen without the State. Thus from the sale of speed horses to sportsmen and cavalry, and draft horses to government, we have received a very respectable income from this class of farm stock which can so well be spared.

The exhibition of sheep was larger than last year, though we do not notice any particular improvement in the appearance of flocks. There were individual animals on exhibition, that perhaps excel anything of the kind ever exhibited in this Society; if not excelling, certainly not excelled. Much attention is now given to sheep husbandry, and with good success. Flocks, either large or small, of *good* sheep, are to be found on almost every farm, and in most flocks the heavy fine fleece of the Spanish merino is visible. No full-blooded native sheep are to be found in this Society.

But few swine come up to our annual feasts, although our shows are always graced with a few first class hogs of larger and smaller growth. The high price of grain for the last year has sent many *lean* hogs to the shambles. The number of hogs for the slaughter has greatly diminished during the last year, but the weight of pork has not diminished in the same ratio, from the fact that the few are better fattened than the many.

The butter and cheese on exhibition, though not large in amount was of good quality. We think there is a perceptible improvement in the quality of butter made in this region, and we hail with joy any indications of improvement in this direction. The amount of butter made this year, is less than usual, from the fact that the number of cows, as well as horses and other stock, has been diminished to give place to larger flocks of sheep. Our butter is finding a better market in other states, than ever before, which fact we hope will stimulate our farmers to more efficient efforts to bring up the products of the dairy to that standard of excellence that will enable them to compete successfully with the dairies of other states.

No premiums were awarded on field crops. Good specimens of some kinds were on exhibition; but for want of sufficient information in regard to manner of culture and cost of production &c., premiums were withheld. The amount required by law was offered upon various field crops. The hay crop this season is lighter than last year. The drought in the early part of the season, which extended up to nearly the usual time of beginning haying, prevented the grass from attaining its usual growth and, in fact, the hay crop had the appearance of coming in extremely light, but the drought broke at this time, and a long season of dull or cloudy and wet weather ensued, which prevented farmers from harvesting the then meagre crop of hay, and gave the grass an opportunity to attain to a far more respectable growth. Hence the hay harvested thus late in the season, was not much less in bulk than an average with other seasons. But the quality, from being grown in wet weather, and a considerable portion of it harvested in what the farmers term catching weather, is very much inferior to that of last year. We now frequently hear the remark that hay does not spend well, which is accounted for as above. Grain crops are better than hay. The growth of straw is nearly equal to other years, but the grain is not as well filled, rendering it less valuable and yielding less in proportion to the amount sown than last year. But a larger breadth having been given to most kinds of grain, the total value of the grain crop, is perhaps not less than last year.

Owing to the cold weather in spring, and the indications of a cold season, less corn was planted than usual. But the persevering husbandman, who did not withhold his hand, by reason of the cold, rejoiced as he gathered his fully ripened ears into his garners. The yield was not large, but the corn was of superior quality.

There was a large amount of potatoes planted, but they did not do as well as last year, being injured in the growth by early drought and late wet weather. The amount harvested is much less in proportion to the amount planted than last year. The rot also has prevailed to considerable extent. Hence, notwithstanding the larger amount planted, the crop is no larger than last year.

Very respectfully submitted,

C. K. Turner, *Secretary.*

NORTH WALDO AGRICULTURAL SOCIETY.

Secretary's Report.

The Third Annual Show and Fair of the North Waldo Agricultural Society was held at Unity Village on the 21st and 22d of October last. The weather was very fine, and the attendance larger than at any previous exhibition of the Society. The show of stock, especially oxen, was said by good judges to have been as good as at any show in this part of the State. Several pairs were on exhibition, girting from seven feet to seven feet, eight inches, nicely matched and fine shape, several good stock and dairy cows, a good show of steers and heifers, calves, &c., some extra good horses, and of course some not so good.

Quite a number of sheep were shown, most of them of the long wool variety, and a large number of bucks.

In the crop department, but few entries were made, but the statements showed a large yield per acre, viz: Corn, 80 bushels, shelled, per acre; wheat, 20 bushels per acre; barley, 30 bushels per acre.

Of manufactured articles quite a variety was presented. Fruit was scarce, but several fine samples of apples were on the tables, most of them winter varieties. The dairy was well represented by several parcels of excellent butter, and some first rate cheese.

On the second day of the Fair, had the *inevitable horse trot* (which by the way don't amount to much). In the afternoon an excellent address by E. H. Prescott of this town.

Respectfully,

B. B. Stevens, *Secretary*.

YORK COUNTY AGRICULTURAL SOCIETY.

Secretary's Report.

Herewith I hand you the statement of the "financial condition and doings of the York County Agricultural Society, for the year ending Dec. 2d, 1863 :

Financially, the year has been a very successful one. The weather at the time of the Fair was admirable, and much of the success of the Fair was owing to this fact, a great number of people being in constant attendance throughout the several days of the Fair.

The show of fruit was smaller in amount than last year, as was also that of vegetables and grain ; but the quality of that shown ranked high, much of it.

The show of stock on the grounds was better than for several years, perhaps better than any former exhibition of the Society. Among the most noteworthy on exhibition was the Ayrshire stock of Messrs. Dane and Lord of Kennebunk, and McKenney of Biddeford ; the Devons of Mr. Perkins of Kennebunk, and the sheep of Mr. Jordan.

Yours respectfully,

John Hanscom, *Secretary.*

KENNEBEC COUNTY AGRICULTURAL SOCIETY.

FROM REPORT OF THE COMMITTEE ON JERSEYS AND GRADE JERSEYS.

To the Trustees of Kennebec County Agricultural Society:

It was a source of gratification, to a part of your Committee at least, to find the exhibition of Jerseys the present year made up of more individual specimens than any other kind of farm stock on the ground. Whether this was owing to apathy on the part of the owners of other breeds of stock, who have heretofore profited so largely by the encouragements of the Society, until like "Jeshuren" of old, they have waxed fat, and kicked up at their old patron—or to the greater activity and zeal of the Jersey breeders, it is not our duty to decide. We merely mention the fact for the consideration of the trustees. And we also call the attention of both the farming public and the moralist also, that this increase of Jerseys is owing wholly to the attributes of meekness and good works on the part of the hitherto despised Jersey cow, rather than to any particular stateliness of appearance, or *blubber* on the ribs, or bluster on the show-ground.

Whatever may be the peculiar prejudices or biases of people in favor of this or that breed of cattle, they all prefer *cream to skim-milk,* and the calls and demands of the stomach in this respect, invariably knock enough good judgment into their brains to induce them to appeal to the meek and lowly Jersey for a supply of the genuine article.

We have not time now, to go into a discussion of the merits or demerits of this race of cattle, or to point out in detail the good or bad points of the several specimens submitted to the judgment of your Committee. This we are willing to do at a more convenient opportunity.

Your Committee ought to have had more time in which to perform their services, and we will remark here, in passing, that farmers err greatly, in making this, their only festival in the year, such a hurried piece of business. One would think by the feverish trepidation manifested, that the continuance of the life and the temporal salvation of "all the world and the rest of mankind" depended upon the dispatch which they could use in a given time during the exhibition. Think you that a little arrangement of affairs at home, in season to allow you more time and leisure, and more social communings with each other, for a few days at the cattle show, would not improve your social feelings—the brotherhood of interests—your fund of practical knowledge, and, by consequence, in course of time the funds in your pockets any? We beg pardon for this friendly *kick* at what we consider a fault in our habits at these shows, and hope that the trustees, if they cannot pardon in us something to the spirit of liberty, will attribute this digression to the hearty and exhilarating effects of Jersey milk, which, in imitation of topers of another class, we are apt to imbibe to excess, especially when we can get it for nothing.

From Report on Horses.

The horse is indispensable to the prosperity and strength of every civilized community, and, of course, the rearing of them is one of the most important branches of farming. The utility, and consequently the value of this animal, depends upon its good qualities, and the capability of its performing cheerfully and promptly all the varieties of work required of it. Hence it is a great object to rear only those which shall have a suitable combination of strength, speed, endurance, and that beauty which arises from just symmetry of form, spirit, and energy and intelligence, united to kindness and docility of disposition. These characteristics enhance the value of the animal, and the horse that lacks a part of them is decreased accordingly in value, and, if it lacks all of them, is in reality a nuisance, and should be "abated" as such.

We have said that the horse is indispensable to us. If it is so in a time of peace, it is emphatically so in times of war, for without it our armies could do nothing. This fact renders the breeding of good horses, not only a profitable business at the present time, but also a work of patriotism. Hence its encouragement by agricultural associations becomes also a duty, to neglect which, would be virtually neglecting the calls of our country in the hour of its peril. A look into the statistical tables of the Census Bureau of 1860, will give a little insight into the importance and magnitude of this department of farm stock.

In 1850, the number of horses in Maine, was 41,721. In 1860, they came up to 60,638, being an increase of 18,917, or nearly 20,000 in ten years; allowing their average value to be $50 each, and it would amount to $3,031,900. We all know that in 1861, the present unhappy war broke out, which immediately created a vast demand for horses to be used in the various departments of the army; and it is creditable to Maine that she has furnished so large a quota of such excellent horses, as all who know anything of the facts, are willing to allow she has.

The uses of war and the severity of battles destroy immense numbers of these useful animals every month, and the call for them is urgent and continuous. It is therefore an indisputable fact that the business of rearing horses, which in time of peace was profitable, becomes doubly so now, and will continue so for a number of years. Our farmers therefore should be alive to this interest, and spare no pains to raise those which shall be A No. 1 in every particular.

THE ADAPTATION OF WASHINGTON COUNTY, MAINE, TO SHEEP HUSBANDRY.

An Address delivered at Columbia, February 23d, 1863, before the West Washington Agricultural Society, by George F. Talbot.

In passing over our poorly cultivated and sparsely occupied county, to which I am strongly attached as my birth-place, and that of my father, I have tried to think of some form of industry, by which our barren hills may be made productive of wealth, and our scantily peopled towns may become the homes of a more numerous and thrifty and not less intelligent population. The only enterprise lying within the limits of our moderate means, that bids fair to accomplish these wishes, which I know you all share with me, is the keeping of sheep, and making that branch of husbandry our leading business and the dependence of many families for an income adequate to their reasonable wants. Suppose that every householder in this town, who is farmer enough to produce his own butter and pork, should keep a flock of fifty sheep, you can readily see how large a sum it would add to your valuation. There is not only the income derivable from the wool produced, but these thousands of sheep bring with them many hundred acres of fenced pasture, more and larger barns, a greater breadth of tilled land, for which they yield manure, and from which they demand winter fodder, all of which are permanent improvements; besides spreading the tables of many families with a palatable and wholesome meat.

To devise some better modes or new branches of husbandry is the great end of our society, and if we can encourage by our united counsels the establishment of a business that shall add twenty per cent. to the scanty incomes of our farmers, the benefit we have conferred is almost incalculable.

Wool growing is not an experiment. It is as old as the human race. The sheep has followed man through all his migrations more closely than any other animal. Indeed, save that he may borrow in summer, when not wanted, and about to be thrown away, the coat of his humble follower for his own winter covering, it is easy to see that man could scarcely inhabit any but the tropical regions of the globe. Undoubtedly for many ages the sheep fared as hard as the fur-bearing animals still do, who yield up their wool, their skins and their lives; and the gentle-hearted reformer who first suggested shearing off the wool and leaving the sheep to grow another fleece, was doubtless stoutly resisted by the *conservatives* of his times. But that old controversy is forgotten in the din excited by later innovations.

The methods of sheep husbandry are not wholly unknown, though most of us remember the feeding and care of sheep as an employment of our childhood. I doubt, however, if there are as many skilful shearers of sheep in your town of Columbia, as there were forty years ago, when you had not a third of your present population. As to the home manufacture of wool in our houses, there is a still greater degeneracy. The pianos outnumber the spinning wheels; and there are more Washington County women who can read Schiller in the original German, than who can skilfully card hand rolls. Still these so recently *lost arts* are not so wholly forgotten, that the economy, which our hard national fortunes may compel us again to learn, may not bring them back in all their ancient glory.

We may safely enter upon the production of wool, because it will ever be, as it has ever been, a prime article of human consumption. There will always be a demand for it in the markets of the world, so long as the earth shall maintain its present alternations of heat and cold. Though it preceded by many ages all other fibrils in its use for human clothing, it has maintained its superiority over all other textile fabrics. Notwithstanding the gorgeous glossiness which delicate art can give to silk, as spotless and smooth and fine as woven linen may be made, as flexile and tenacious and unchanged when subjected to water, heat and friction, as muslin is, there can be more beauty, durability, worth, and consequently price, combined in a square yard of woolen, than in an equal quantity of either of these materials. The African and Hindoo wear their bands of hand woven cotton, or full garments of delicate nankin the Chinese and Japanese nobility flaunt in their purple and yellow silks, but the cultivated European and American wear as a badge of their highest civilization, the sombre-colored, unpretending, but costly and durable broad-cloth coat. There seems to be a natural congeniality between the fleece and the human skin. It was in the very infancy of man that the sheep befriended his helpless nakedness, and the covering worn so long, has become for him a second nature. Physicians insist that nothing but flannel ought to be worn next the body, as if every shirt of cotton was a '*Nessus*' shirt, poisoning the delicately organized system with the *virus* of that great crime involved in its production. We need not fear, therefore, any lessening in the world's demand for cloths, for as it advances in wealth, it will require more and more of the richest and best material for garments.

The United States Census for 1860, shows how largely the home consumption of wool has increased in ten years. From 1850 to 1860, the value of woolen and mixed goods manufactured in the country rose from $45,281,764 to $68,865,963, over 51 per cent.,* and yet in the same period we imported about $300,000,000 worth of woolen goods, or about $30,000,000 per annum, and did not export any manufactured woolens. In the same period we imported foreign wools to the value of $34,110,150, and only exported of unmanufactured wool, $1,562,502 worth. The wool-grower can then see how large the demand for his products will be likely to be for the next ten years, namely: for the supply of $230,000,000 worth, the quantity of wool of home growth consumed, with such percentage added as the increased population will require, and of $32,500,000 worth with a corresponding increase to take the place of imported foreign wools, certainly not less than $35,000,000 worth per annum. If it be said that this large consumption cannot be relied upon for a permanent and certain market, and that the prices received for wool by farmers for the last ten years, has been constantly varying, and so often below the fair cost of production, as to have driven thousands of farmers out of the business of keeping sheep, the fact cannot be altogether denied. The average price of wool in the Boston market for the last 35 years has been 50 cents for fine, 42 cents for medium and

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*The amount of wool produced in the United States in 1850 was 52,514,959 lbs., and in 1860, 62,517,153. We may assume that the average production was 57,000,000 lbs. per annum, or 570,000,000 lbs. for ten years, which, at 40 cents per lb. would be $23,000,000 worth.

35 cents for coarse. If New England farmers have not realized as high prices, I think it must be their own fault, first, in not properly washing, shearing, putting up and packing their fleeces; second, in not keeping up the fineness of their staple so as to bring the average up to a medium standard, and third, in selling unwisely when the price was down, or to peddlers and speculators who have appropriated to themselves all the just profits.

I have thus far spoken only of the ordinary condition of things as affecting the future demand for wool in the United States. But we have already entered upon conditions that exaggerate all these estimates. The sudden call for blankets and woolen clothing for a million of men converted into soldiers, and requiring more of such goods than the same million could consume in a time of peace, and because not paid for by themselves, much more quickly worn and replaced, and the great cotton dearth caused by the war and the blockade, which has caused that production to go up from 9 cents for middling Uplands, its ordinary price before the rebellion, to 90 cents, the price at which it is now quoted in New York, has greatly stimulated the production and enhanced the prices of manufactured woolen goods. The vast expenditures already made and still to be required for carrying on a war of such proportions as that which has befallen our country, has necessitated a high tariff system to produce adequate revenue to keep up the national credit which affords ample protection to the manufacture of woolen. The price of wool has not advanced as it otherwise would on account of the low duty of 3 to 9 cents per pound on foreign wools. Still from these causes, combined doubtless with the expansion of the currency, the price of wool has gone up to 65 for fine, 55 for medium and 40 to 50 for coarse, by no means a speculative price, and more likely, as financial reporters say, to rise than to fall.

Of the three causes I have named for a rise in the price of wool, the first, the war, we trust, is a temporary one. The cotton dearth too will undoubtedly come to an end, but cotton will not be likely to fall to its old quotations for ten years to come if we fail to subdue the rebellion, on account of export duties the Confederacy will be likely to impose, discriminating against us, and if we succeed because of the change of the labor system of the South, it will take that time for an improved system to begin to justify itself, by cheapening production. The tariff we must have for an indefinite future period, so that contemplating the whole field, it is not likely that the present prices of wool will materially diminish during the next decade.

But even if it were certain that the price of wool would fall after a short period, such is the sanguine temperament of men, and so much more influential is an existing fact than a future contingency however certain, in influencing the judgment, that they will more readily embark in an enterprise now palpably succeeding, but likely hereafter to fail, than in an enterprise now evidently unprosperous, but likely hereafter to succeed. Men always wish they had bought, or invested at a time when prices were low, but only a few shrewd men do so.

But the field of your operations as a society, is the Western part of Washington county, and to that and our own immediate interests let us confine this discussion.

Washington county is well adapted to sheep husbandry, because I had almost said it is adapted to nothing else, we are willing to look our disabilities in the face and own that we have not the grain productiveness of the Aroostook valley, nor the excellent pastures of the Kennebec and Sandy rivers, nor the capacity for raising apples of York and Kennebec counties, nor the upland meadows which have made Belfast such a market for excellent hay. Whatever advantages we do have, and I have no wish to slight them, will be every way enhanced by the more general keeping of sheep.

We have a cold climate unquestionably. Other things being equal, it is safe to conclude that the colder the climate in which the sheep can be kept with comfort to itself, the finer will be its fleece. It has been found that the sheep carried north gains a finer fibre of fleece, and if carried to the tropical regions, either perishes in the migration, or its fine wool degenerates to hair. Hon. Wm. Jarvis, a distinguished wool grower of Vermont, writes: "There was a general opinion prevalent among the shepherds of Spain, that to retain the soft, flexible and felting properties of the wool, the Merinoes must be pastured all the year round. But the experience of the Saxons, and of all those countries where the merinoes have been bred, have proved this opinion to be erroneous. If one was to reason from analogy, we should conclude that the wool grown in a cold climate would be softer than that raised in a warm one, as it is well known that the beaver and all other furred animals found in high Northern latitudes have longer, softer, and thicker fur than the same species have in more Southern latitudes." Hunter, an English writer on sheep, says: "Sheep carried from a cold to a warm climate soon undergo a remarkable change in the appearance of their fleece. From being very firm and thick it becomes thin and coarse, until at length it degenerates into hair."

John H. Erving of Pennsylvania, an experienced sheep breeder says emphatically: "I am of the opinion from my present experience, that very fine wool cannot be raised in the South. In all cases that I have known it tried, the *wool has deteriorated* and the health of the sheep failed."

Mr. L. A. Morrell, whose excellent treatise, called the American Shepherd, I have consulted largely in preparing these remarks, while he insists upon the flexibility of the constitution of the sheep and its capacity to produce fine wool in any climate where properly cared for, fully admits the great law, through which, by the removal of sheep northward they acquire closer, finer, though shorter fleece. It is a conclusive proof of the congeniality of the cold climate of the United States to the finest sheep, that the carefully bred and pure Spanish Merino, brought hither from Spain, has increased its fleece 50 per cent. without any deterioration of quality.

The Abstract of the 8th Census throws some light on the subject in the tables giving the number of sheep, and the quantity of wool produced in each State, in 1860, as follows:

States.	*No. of Sheep.*	*lbs. of wool.*	*lbs. wool per head.*	
Alabama,	369,091	681,404	1.8	
Georgia,	512,618	946,429	1.8	
Mississippi,	337,754	637,729	1.9	
Louisiana,	180,855	296,187	1.6	
Texas,	783,618	1,497,748	1.9	
Average weight per head in five Southern States,				1.8
Indiana,	2,157,375	2,466,264	1.1	
Illinois,	775,230,	2,477,573	3.2	
Missouri,	937,445	2,064,778	2.2	
Michigan,	1,465,477	4,062,868	2.8	
Ohio,	3,063,887	10,648,161	3.4	
Average weight per head in five Western States,				2.5
New York,	2,617,865,	9,454,473	3.6	
Vermont,	721,993	2,975,554	3.5	
New Hampshire,	310,534	1,160,212	3.7	
Maine,	452,472	1,495,063	3.3	
Average weight per head in four Northern States,				3.5

Although there may be some inaccuracies in these statistics,* and although the greater weight of fleece in the last named States may be due to the introduction of improved breeds and to superior management, the results are too striking to deny the apparent fact that sheep of the United States yield in the Northern tier of States, more than twice as much wool per head as they do in the Southern tier of States. By this law the fleece of the Maine sheep should be heavier than those of New York, but it must be remembered that only the coast of Maine is much peopled, where the thermometer in winter does not range lower than in the interior of New York, and also that Maine has done far less than the other states named in this list in improving its native sheep. This becomes apparent from the fact that though Maine had 650,000 sheep in 1840, it produced but 1,465,000 pounds of wool, but 2 2-10ths pounds per head. In 1860, when she had fewer sheep by nearly one-third, the State produced more wool per head by one-half. From this fact it is probable that when our State shall have gone as far as New Hampshire and Vermont in the improvement of the breed of its sheep, its clip of wool will be even greater than theirs, on account of its better climatic situation. Facts and theory therefore combine to establish the rule : Sheep produce heavier fleeces at the North than at the South, and in the East than the West of the United States.

The foregoing reasonings and facts tend to show that the part of the United States where the sheep yields the largest return of wool is Maine, and the region of a corresponding climate. I think we may go farther and say that Washington county possesses advantages for sheep husbandry over any other part of the State. Take the two or three tiers of towns lying next the coast from Passamaquoddy

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* I am aware that statistics collected by the United States Census Bureau are to be taken with some grains of allowance. Since the Census of 1840 put down more insane colored persons to whole districts of the Free States than there were colored persons in such districts, and inasmuch as the Abstract of the 8th Census insists upon giving Maine's proportion of Indian population 3 males and 2 females, one cannot always feel perfectly safe in building a very complicated or doubtful theory on the Census data. I see no reason why Indiana, into which improved sheep could be easily introduced from Ohio, where they produce 3,4 lbs. of wool per head, should produce only 1,1 lbs. of wool per head, for its large amount of sheep, while Illinois with fewer sheep and no better conditions produces 3,2 lbs. per head. The probability is that both these figures are erroneous, and that the production ranges somewhere between Missouri 2,2 per head and Michigan 2,8 per head. The two errors will perhaps about correct each other, leaving the aggregate to stand as I have stated it.

Bay to Naraguagus river, and we have a region of less snow than any other part of the State. It is something more than mere proximity to the sea that causes this phenomenon. I will not stop to speculate upon the causes. It happens that our snow season commences some days later and closes some days earlier than in the region of Bangor, Augusta, or even than in the country back of Portland, while the January thaw, which farther West and North is a mere wetting and crusting of the snow, gives us bare hills and wheeling; and an open winter like this, which occurs about once in seven years, brings no permanent snow at all.* I know how justly and feelingly you farmers have complained of this very condition, as fatal to all your cultivated grasses. But there is no philosophy in complaining of anything so beyond our control as the weather. We must adapt our husbandry to it. The keeping of sheep is, in my judgment, greatly cheapened by this breaking up of our winters. What sheep dread is not cold but storms, and snow storms or rain may drive them to cover in the forests, and snow compel them to seek the shelter of the barn and shed; but if the ground be bare they will range out upon the hills in defiance of cold, cropping browse and stubble and the dried grasses until, as I know from my own experience, it will require the attraction of provender, rattled in a tin dish to bring them back to their foddered racks. Some fifteen years ago a flock of twelve sheep kept by my father subsisted through a whole winter like this, with not more than twenty days foddering, getting their living in the fields, not always, I fear, those of their rightful owner, and their condition and profit may be guesed at, when it is added that they raised ten lambs and sheared four and a half pounds of wool each, which was sold for $26, a return, if the lambs be valued at $2 each, of nearly $4 per head.

I have seen during the year a report of a wool growers' convention in Vermont, at which it was stated that the cost of wintering a sheep in that State, was $1.25, while in Maine it was only $1.† Both these estimates are too low, but if Maine can keep flocks through the winter for twenty per cent. less than Vermont, the great wool growing State of the Union, it cannot be

* In this region, with the exception of about two weeks sleighing in December there was no sleighing the present winter, until the first day of March and for twenty-four days that followed it.

† Reported in the New York Daily Tribune.

because hay or provender is cheaper in Maine, for our extensive lumbering operations and poorer agriculture make both considerably dearer, but because the openness of the winters on our coast shortens the foddering season.

I find in the Appendix of Mr. Morrell's book, reports as to the length of the foddering season in different States, and the quantity of hay necessary to winter a specified number of sheep. None of them put the foddering season at less than 150 days. In Pennsylvania even, one sheepkeeper states that the foddering season is from five to six months.

I find from the statements I have received from persons in this county, that an average foddering season here is 150 days, though some feed only 130 days, and careful sheepkeepers say they would not feed so long as 150 days if they had suitable pastures. These statistics show that Washington county labors under no disadvantages in respect to wintering sheep, in comparison with the great wool-growing regions of the United States. Nor is the expense of shelter an extra expense, for as far South and West as Ohio, all the wool-growers insist that winter shelter is essential to the successful keeping of sheep.

Washington county possesses another advantage for sheep husbandry in the abundance of cheap, poor and rocky land. We have about stripped three tiers of townships of their timber, and the fires that have followed in the wake of our logging, and wood and piles and lath gleaning, have denuded our coast, until it is far less furnished with forest, than are the rich farming regions of New York and of the Kennebec river in our own State. The great fires of 1851 I think quite changed the aspect and growth of many of our townships. Lubec, Trescott, Cutler, Machiasport, Jonesport were then extensively burnt over, and pasture grasses, moss and bushes have taken the place of timber-yielding forests over hundreds of acres. Machias, East Machias, Jonesboro', Columbia, Steuben and Harrington suffered from earlier fires. In all these towns there are thousands of acres for the most part unfenced, upon which natural herbage grows sufficient to feed many thousand sheep. There is a tract in Trescott, another embracing the principal surface of Jonesport, Jonesboro', with parts of Machias and Whitneyville, having no saleable value, which sheep instead of exhausting would slowly fertilize.

Are such lands adapted to sheep? I answer, from all I have been able to learn about the subject, admirably. They are just barren enough, just dry enough, and just elevated enough to produce the best quality of wool. It has been found by experiment, that luxurious pasturage and high feeding, though it promotes bulk of carcase and fatness, is unfavorable to the growth of the finest wool. It was in testimony some years ago, before a committee of the British House of Commons, that the artificial food and forcing system, which produced the mutton for which England is famed, had deteriorated the character of its wool. Of the Norfolk sheep it was stated that whereas in 1780, 420 pounds of wool produced 200 pounds of prime, in 1828 the same quantity would produce but 14 pounds.

Dr. Parry, an English writer on sheep says: "The fineness of a sheep's fleece of a given breed is within certain limits inversely as its fatness, and perhaps also as the quickness with which it grows fat. A sheep which is fat has usually comparatively coarse wool, and one which is lean either from want of food or disease has the finest wool."

John H. Erving already quoted says, in speaking of the influence of climate on sheep: "Much depends in my opinion on the soil. High, poor lands will produce better wool than rich low lands. I sent a flock a few years since to Warren county, Illinois, about our latitude; and after three years I hardly knew my own wool. The quantity of fleece and size of the sheep have increased, but the wool has not retained its fineness. This no doubt arises from the pasturage; they become very fat in the summer, which increases the brashness of the wool, and destroys that delicate texture it has in the more eastern and high lands."

Mr. Morrell, in whose treatise I find the foregoing citations, adds among other remarks confirmatory of these opinions: "It may, however, be remarked that the cheap uplands not easily made arable for general agricultural purposes will eventually be occupied for the cultivation of the finest wool, simply *because they are best suited to the purpose.*" It has already appeared from our statistical tables, that fineness of Northern wool is not at the expense of weight, and that with their rich prairie pastures the western farmers produce a pound less wool to the head than the northern farmers.

These principles tend to establish the advantages of our county for wool growing over the Southern States, in that our cold climate produces more abundant and finer fleeces; over the Prairie States, in that our dry and lean pasture lands give additional fineness to the staple; over our neighbors in Vermont, New Hampshire, Aroostook and Kennebec counties, because our open winters shorten the foddering season, and with our cooler summers make our climate a very little more uniform than further interior, where the extremes of heat and cold are somewhat greater.

So far as proximity to market is concerned, we certainly have the advantage over most of the sheep-keeping regions of the country. Boston is, and will long continue, the great wool mart of the United States; and the freight by sea from any of our coast towns must be considerably less, than the railway freights from the interior of Vermont.

Perhaps we shall be able to discover what this eastern county was made for, a problem hitherto not void of difficulty. The lumberman has ravaged and burnt it, the fisherman has dried his nets upon it, and after them you farmers have tried to enrich and subdue it for the raising of potatoes, hay and cattle. But its true destiny may be to be the place

> "Where shepherds watch their flocks by night,
> All seated on the ground."

and when they do, the angel of prosperity may come down upon it.

Let us now consider what returns may be expected from keeping sheep in this county with such facilities as we have. The items of cost are, first, winter foddering and provender; second, summer pasturage; third, washing and shearing. There will of course be more or less expense in driving to and from pasture, changing pasturage, taking up bucks and lambs, and the winter care. But these light labors of the farmer are to be offset by his profits, and are too uncertain to enter into a schedule of expenses. Then there is the loss by sickness, by thieves, by dogs, wolves and bears; but these every sanguine keeper hopes to avoid altogether. Like losses by fire and flood, they destroy all calculations. If wolves or dogs devour our whole flocks, of course not only our nett profits, but our capital stock and outlay upon it are gone. So we lay this out of the account, and proceed to estimate the certain and ordinary items of cost. Three-fourths of this is the winter foddering.

What it will cost to winter well a hundred sheep depends upon the size, ages and kind of sheep kept, and upon the length of time they are foddered. The cost of hay to a man who raises it, is less than to him who buys it; and some men may have abundance of English or meadow hay remote from a market, with whom the question only is: with what kind of stock shall I consume this hay upon my farm. Then again some farmers are liberal feeders, and cannot go to their barns or sheds without throwing hay into the cribs or racks; others feed scantily and make the animals go as long as possible on their muscle.

Let us assume, then, that the sheep is the cross breed kept in this county by the best managers, a cross of the merino with a larger, long-wooled native or foreign sheep, say the Cotswold, the ewes weighing at two years old 90 lbs. live weight, with only the necessary proportion of bucks, as one to fifty ewes, and only the ewe lambs kept, the other lambs being sold before the foddering season. What will such a flock require per day per head? Here is a table setting forth the judgment of the most eminent foreign writers upon sheep husbandry upon this point: *

Petri,	3 to 3½ lbs. per head a day for a sheep of 70 lbs live weight to fatten.
Thaer,	3½ lbs. per day, or 52,000 lbs., 26 tons, for 100 sheep for a winter.
Veit,	2½ lbs. per day per head for a sheep weighing 100 lbs. live weight.

Veit also gives this table:

For a long wooled German sheep of 100 lbs. live weight, 2-50 lbs. daily, 380 lbs. for the winter.

For an Infantado Merino, live weight	88 lbs.,	2-20 lbs. per day,	330 for the winter.
For grade Saxon Electoral "	75 "	1-87 " "	280 "
For pure " Escurial "	62 "	1-55 " "	232 "
For one-eighth Electoral "	66 "	1-65 " "	247 "

When it is considered that this statement is predicated upon a foddering season of 150 days, quite as long as ours, the quantity of fodder seems very small, but it must be borne in mind that these are fine-wooled sheep, considerably smaller than the average of ewes.

The Baron Von Sternerg, in his description of the management of Saxony sheep furnished in 1859 to Mr. Wright, United States Minister at Berlin, says: the sheep are stabled all winter, generally from the *first of November* to the *middle of April*, according to the season; and that one-thirtieth part of the weight of the live animal, in good hay, is considered necessary per day for its sustenance."

This is a higher estimate than that in Veit's table by about one-third, and allows 3 1-2 lbs. per day or 500 lbs. per 150 days, for a sheep whose live weight is 100 lbs.

* Morrell's American Shepherd.

Mr. Spooner gives the English rule of foddering as 3 1-3 lbs. to every one hundred lbs. live weight. The opinions of experienced American wool-growers on this point, seem to be quite as variant as among foreign writers on sheep husbandry. I have looked over the statements of nine different keepers of large flocks in New Hampshire, Vermont, New York and Pennsylvania, and they estimate differently from 120 lbs., the smallest, to 500 lbs., the largest, as the weight of good hay necessary to winter a single sheep.

To be better prepared to present this subject, I addressed letters to some twenty-five different gentlemen in this county, who, I knew had given some attention to sheep breeding and on this point of the number of pounds of English hay necessary to winter a sheep in this county, the opinions expressed seem to be very wide apart. Mr. Wilson of Harrington, thinks 200 lbs. of hay will winter a single sheep. Mr. Lowell of East Machias allows 300 lbs. Mr. Levi Wass of Columbia, judges that it will require 600 lbs. Mr. Dana of Perry, a very careful feeder and a scientific farmer, asserts that from weighing of fodder for one winter fed to his flock, he found they consumed 422 1-2 lbs. each, but he acknowledges that he has not been able to exclude the bucks from his ewes, so as to prevent his lambs coming in the winter.

From all these data it seems safe to estimate 400 lbs. as the quantity of good hay necessary to winter well a single sheep, and if the management I hereafter advise, as to winter grazing and late lambs be followed, I think this quantity might be reduced to 350 lbs. The hay raised upon our farms, although most seasons in good markets it will nett more than that, cannot be reckoned higher for all years and through the whole county, than $10 per ton.

It has already appeared that in Germany, where lands are dear and pasturage and fodder costly, money is made raising wool and feeding not less than 5, and sometimes 6 *months of the year.* The practice in the Northern and Middle States seems to be to stable sheep from 5 months to 5 1-2 months. Our Washington county farmers generally calculate to feed 150 days, but some say 120 days. It seems to me that by bringing on the yeaning season in May, and having a pasturage of bushy land and stubble and clover stalks for winter ranging before the snow comes, or during the winter thaw, the feeding season may be reduced to 130 days.

The next item is pasturage,—difficult to estimate in the case of men who have abundance of open lands under fence, and which costs but little and has no marketable price. But it would not be unfair to reckon 6 per cent on lands at $10 per acre, and two per cent. on cost of fence at $1 per rod, and allow thirty-five acres to 100 sheep, pasturage would thus be worth about 30 cts. per head. Washing and shearing would not be far from 12 1-2 cts. per head.

From reports received of the sheep now kept in the county, it appears that the average of fleeces is 4 1-2 lbs. per head, or washed on the sheep 4 lbs. Flocks with the wethers excluded ought to produce 75 per cent of lambs, and by breeding from the Cotswolds more may be expected. Two dollars would not seem too large an estimate for the lambs, and if old ewes are marketed or slaughtered with pelts at 50 cts., and tallow worth from 50 to 75 cts. per carcase, it does not seem difficult to make them pay every year not less than that sum. The winter manure, if the sheds are well supplied with litter, would be at least one cord for every two tons of hay consumed, or 30 cts per head. We should then have for an average sheep of the flock the following account:

Dr.			
400 lbs. of English hay for 130 days foddering, at 50 cts. per cwt.			$2 00
Pasturage for the summer,			30
Washing and shearing,			13
Total expense,		$2 43	
Cr.			
4 lbs. of wool washed on the sheep, at 40 cts. per lb.	$1 60		
¾ of value of one lamb at $2.00,	1 50		
Winter manure from sheds and yards,	30		$3 40
Net profit,			$0 97

Allowing that the flock has been bred by the farmer, they have cost him $2 per head, and if the annual return is about $1 per head, then the profit of sheep is 50 per cent. besides paying a fair percentage for the use of land.

Anything that can be taken off this cost enhances the profit. If hay can be raised for less than $10 per ton, or if barley straw can be raised for less than $5 per ton, or potatoes, beets, or turnips for less than 15 cts. per bushel, or peas for less than $18 per hundred weight, then these articles may be substituted for hay. And if by crossing with a new breed, more or finer wool can be raised, and a larger percentage of increase insured, then the profits may be enhanced on the credit side. I have no doubt from examining the statements of sheep keepers in this country, that aside from the depredations of dogs and wild animals, an average profit of $1 per head is made here in keeping sheep. It may be remarked that wool is now worth 50 per cent more than the sum I have allowed, and that pelts alone are sold now for what I have computed the live carcase to be worth. On the other hand hay is worth $15. The calculation is certainly a safe one, judging from the state of the market for the next ten years.

Another advantage to accrue from keeping large flocks, is the supply of the means of fertilizing and tilling more acres of arable land, and thus adding to our grain and hay product. Whether the excrements of sheep are richer in ammonia and phosphorous than of horses and cattle, or whether from their compact form and manner of distribution they combine with straw litter and mould so as to make a compost that absorbs all the valuable gases, and resists the leaching of rains and evaporation of heat, I am unable to say, but it is certain that agricultural writers unite in a high estimate of this manure. Mr. Kennedy in his Condensation of the Census says: "Sheep are a necessity of a good general system of husbandry on even the highest priced lands, and amidst the densest population. They afford as much food to man in proportion to their consumption as any other domestic animal. They are believed to return more fertilizing matter to the soil (than any other.)" Baron Von Sternberg, in the statement to our Minister, Mr. Wright, to which I have alluded, says: "Every day a little clean straw is laid down, which being mixed with the excrement of the sheep, is compressed by them into a solid mass, forming the floor, which is perfectly dry and sweet. The consolidated manure thus formed, is not the least of the profits derived from the sheep. No other farm yard manure is equal to it, and for turnip crops, and especially for rape seed it is the best fertilizer, as not being exposed to the open air, and being well compressed, it retains its ammoniacal properties."

No increased fertility is expected in lands pastured by oxen, cows and horses, but it has long been known that the keeping of sheep upon land improves its fertility. Our accomplished Secretary of the Board of Agriculture, Mr. Goodale, in his Report for 1857, remarks: "The sheep, of all domestic animals, is the least dainty in its tastes and the easiest fed, eating freely, it is said, of a hundred different species of plants which are refused by the horse and the ox. They are thus of great utility in cleansing foul lands, by the extirpation of troublesome bushes and briars, and noxious weeds. They feed upon all such with avidity and fairly destroy them. Their digestion of what they eat is so perfect, that no weed seeds, after passing this ordeal, retain their germinating power." Recurring to the same subject in his Report for 1859, he gives these facts: "I saw it recently stated that in Lynn some land was bought and enclosed about eight years ago, a hundred acres of which would not afford a cow a living. Only as many sheep were first pastured upon it as it could carry, and the number was increased by degrees, so that the third year three hundred were well kept on two hundred acres. On the parts most closely fed, the wild roses, whortleberry and blackberry bushes, and woodwax were almost entirely killed, and there was a very good sward of blue grass, red-top and white clover." The editor of the New England Farmer, writing from Hingham a year or two since, said: "Some of the finest examples are afforded here of the effects of feeding sheep upon pastures that have become exhausted of nutritious grasses, and grown up to briars bushes, brakes and moss. I have seen pastures to-day that had become almost worthless, but are now green and smiling as a lawn, with every inch among the rocks covered with the richest pasture grasses, and not a blackberry vine, wild rose bush, mullen, or other worthless plant in sight. The sward does not seem compact and bound, but loose and porous, and filled with the most healthy and vigorous roots. The sheep grazing upon these pastures afford ample evidence of the richness and luxuriance of the grasses upon which they feed. These examples, with similar ones that I have met in other places widely remote, would seem to shed light upon the perplexing question so often asked, *How shall I reclaim my old pastures?* All over New England there are thousands of acres producing little or nothing, that might be renovated by the introduction of sheep upon them, while the profit from the sheep themselves, I believe, will be larger than from the same amount of money invested in cows. I have been told of an instance where a hundred acre pasture fed scantily only 12 sheep and 6 cows the first year, but on the second summer fed well 20 sheep and 12 cows, and continued to increase in fertility until more than double this number were well fed upon it." *

* Report of the Secretary of the Board of Agriculture of Maine for 1859.

The unfenced lands of this county are not in nearly so barren a condition as the Massachusetts pastures. We may therefore stock them with sheep in the confidence that in a few years they will become valuable for pasturage for cows and even for tillage.

Let me name one more advantage we shall derive from sheep keeping—the supply of wholesome meat as an article of ordinary diet in our families. The annual slaughtering of the wether lambs and of the older sheep to keep the flock in its most profitable condition will supply annually to each keeper of fifty sheep, from thirty to fifty carcases to go into the market and return in cash or be consumed in the family. Our butchers charge us from 7 to 11 cents for lamb through the summer and fall, and while pelts are worth what they now are, I know that at four cents for the meat, good lambs will pay $2 1-2 to $3 each to the farmer. Then how much more wholesome or palatable upon your tables would mutton be, than the perpetual fried pork which forms so much of your diet. Three quarters of our households are women and children; I cannot believe that either have a relish for salted pork, save as they acquire it by obstinate use, as men learn to love tobacco. I believe the taste of these portions of our families, and the health of all would be consulted in the substitution of wholesome mutton for fat pork, which might go to market and take the place of the poor but high priced Ohio pork, upon which we lumber and fish, and upon which so many families subsist. I once asked an Englishman by whose side I was laboring, who was boasting of English mutton, as the natives of that island are apt to boast of everything pertaining to it, "How do you get the *sheepy* taste out of it, and he answered with a grunt, "*Don't want to get it out, that's what we like.*" And he was all in the fashion, for mutton has fairly eclipsed the roast beef in old England in the choice of epicures; and when the champions of international pugilism went into training to put themselves in highest condition, they fed upon rare mutton moistened with ale. Rev. Henry Colman in his work on European Agriculture says, "we I think, as a people, have yet to acquire a taste for mutton. In this respect we differ altogether from the English, with whom, in spite of all we hear about "*the roast beef of old England,*" mutton seems everywhere the preferred dish.

As to the management of sheep, if I had prepared myself to give advice, as I have not, the limits of this address will not permit me to enter upon the topic. I would recommend that all persons desirous of beginning sheep husbandry, who may desire more information than they have been able to procure from their agricultural papers, and the excellent reports of the Secretary of the Board of Agriculture of our State, should purchase a wool grower's manual. The work of Mr. Morrell seems to be everything that is desirable for such a purpose, and I hope many of you may order it, and read it, and then lend it to your neighbor. Would it not, by the way, be a very judicious expenditure of the funds of the society, to procure some twenty or thirty dollars' worth of standard agricultural books, to be loaned by the Secretary to members of the society for certain periods. There are a few topics as to the management of flocks, which seem to me cannot well be passed over without mention.

And first, as to the breed of sheep desirable to be introduced into Washington county. Where sheep are kept in small flocks of from ten to thirty as now, mainly for the production of stocking yarn and homespun flannel, undoubtedly a long and not too fine wooled sheep is the best. I judge from the reports I have collected of the amount of wool sheared from the sheep now kept in this county, that there are breeds and cross breeds now acclimated among us, as well adapted to these purposes as any other. I know that there is home manufactured stocking yarn, now made in this county and in this town, in too small quantities, superior in beauty as in strength and durability, to that made in our factories. The native sheep if we have such, I mean those that have been kept for many years here, are very prolific, many of the lambs raising lambs at a year old, and sure of progeny at two years, and so good nurses, that the number of twins, if well tended, will make the lambs equal the whole flock annually. For these purposes, of the celebrated foreign breeds it seems to me that the Cotswolds and their grades are the best. They are a long-wooled, hardy race, requiring less rich pasturage than the Leicesters and producing fleeces than the South Downs.

But if sheep keeping is to be entered upon as a leading branch of farming, the sale of wool and not the sale of manufactured wool or of mutton, must be the object. We are too far from a great meat market to raise the South Downs or Leicesters. So that the question to settle at the outset is, what kind of sheep in this climate, and with our pasturage and foddering will produce the most money worth of wool. The usage of our farmers has concurred with the opinion of our best writers that the Spanish merino, or rather the American merino, for by his American migration this choice breed has been improved in the quality of his wool about fifty per cent., is the best for this purpose. Undoubtedly pure merino bucks and ewes can now be selected among the flocks in this State, though it might be desirable to visit New Hampshire and Vermont to insure the best selection. I believe that in no one thing could this society do more to promote the agricultural prosperity of these towns than in purchasing not less than two prime, pure American merino bucks and six pure merino ewes, and committing them to such careful sheep keepers as should either purchase them at cost, or else come under bond to sell their progeny within the jurisdiction of this society at the price of native sheep of the same age and sex. A similar purchase of Cotswolds, to cross with and take the place of the native sheep as far as possible. The Merinos are not prolific, and in Saxony are not permitted to begin to produce lambs until they are two years old. They are not good nurses and rarely produce, and are not, under good management permitted to raise twins. It will be seen that to purchase a pure buck to begin with would take much money, and to wait for their slow increase from pure stock would take too long time. Procuring, with the aid of this society, a few animals of the pure stock, the best ewes of the native sheep will do to form the basis of the future flock. It will be seen that the 1-2 and 3-4 blooded Merino wool brings a price only a trifle less than the pure blood. By Walter Brown's Monthly Wool Circular for February, it appears that no distinction is made between full-blooded and three-quarter blooded merino wool quoted at from 70 c. to 75 c. per lb., while half-blooded rates at 67 to 68, only from 3 c. to 7 c. less. All writers agree that the wool-bearing qualities are much more largely taken from the male than the female parent. So that by using native sheep, or coarser-wooled ewes to breed from, we are sure to get, first, larger sheep and so heavier fleeces; second, better nurses and more lambs, and earlier maturity, at the expense, it is true, of getting greater consumers and slightly coarser fleeces. I think it would be the testimony of all who have kept sheep successfully in this county, that more money can be made from a flock of half bloods than from one of pure bloods. After a few years, and when the Merino has become the predominant blood, it will be desirable to return to the proper medium by using long-wooled bucks of a good stock. I think the Cotswolds the best for this purpose.

The points of the Merino which have led to its preference among our sheep keepers are undoubtedly its hardiness and capacity to thrive on poor pasturage, like ours, its compactness of fleece, which gives it power to resist the coldness of our climate,—its quietness, staying within the bounds of any reasonable fence, and never scaling stone walls until it has become demoralized by associating with our long-legged racers,—its longevity, maintaining its prime qualities till 6 years old, and lastly, the unequalled fineness of its fleece.

What is called the felting property in wool, that which gives strength to the spun thread, and closeness to the woven cloth, is due to the peculiar construction of the fibre. Each filament of wool is a hollow, semi-transparent tube, not smooth, but covered upon the outer surface with pointed, leaf-shaped projections, which, viewed upon the edges through the microscope, look like the teeth of a splitting saw. These filaments are not straight, but curved in spirals or whirls, and generally the number of curls is greatest in the finest wools. By constant manipulation the hatter forces these curls into each other, and then continues this pressure and percussion until the teeth of one filament firmly bites into the inverted teeth of the next, until the mass has assumed the compactness and closeness of felt The same process is performed by the pressure of fulling, whereby the projecting filaments of the thread are matted together to form a close nap, which gives to cloth its beauty and finish. The Saxon wool, which is the finest Merino, has the most numerous curves in the filaments, and has been found to have 2,720 serrations or teeth to the inch. The South Down wool has fewer curves and 2,080 serrations to the inch. Leicester wool is almost straight, and its serrations are 1860 to an inch. *

I think it is indispensable to the successful management of a flock, to separate the lambs from the ewes in August, and to exclude the bucks until December, when the flock is brought up to the barn for fodder. By suffering the lambs to suckle their mothers through the whole season, it is found that they gain nothing above what they would get if weaned and made to depend upon pasturage at a time when it is abundant, and will form in fat and flesh all that the stomach can assimilate. No one can have wit-

* Morrell's American Shepherd.

nessed the reluctance and evident pain with which the parent ewe submits to be attacked by sometimes two lambs, apparently as big as the dam, one upon each side, without feeling that her physical powers are somewhat overtaxed. On all good farms the flock master carefully separates the lambs from their dams as early as August. Nor is this enough, for if the bucks are suffered to run with them, as soon as the flow of milk stops, they will commence a new gestation, whereas, if during the four months, when, on the whole, the feed is the richest, the ewes are exempted from the exhaustive duties of maternity, they can accumulate fat, and gain length, compactness and softness of fleece, by which they can live through the winter on comparatively little fodder, and better withstand the cold. The too common practice is to leave both lambs and rams with the ewes, whereby they come to the barn early and poor, and craving large supplies of fodder, and then the yeaning begins on some cold night in January, when the mercury stands 20° below zero, and the farmer is lucky if half his lambs do not die. The feeder sees his hay waste faster than he calculated, and his sheep exhibiting in the tattered locks about their necks, and in the jutting out through their wool of the hip bones, that they have been overtaxed, and is obliged to resort to provender to winter them out. Let the farmer carefully adopt the other method, and in the first place he need not begin foddering so early, nor continue it so late, and in midwinter, when the ground is bare, he need not trouble himself if his sheep do not come up every night to the pen. He may also dispense with provender, and his lambs coming in the pastures in May will be better and stronger, and his losses not one-fourth of what they would be in January and February. There will scarce be a perceptible difference, in October, in the size of the lambs that came in May, and those that came in February. Mr. Jonas Webb, a famous English breeder, of South Downs, speaking of late yeaning, lays down this maxim: "In general way the later they lamb, the more they twin."

The great thing, is to lessen, as much as possible, the expense of wintering. I think 25 per cent. may be saved by weaning the lambs, and bringing on the yeaning season in the month of May. Many have, doubtless, endeavored to keep their sheep out late in the fall, but have found that it did not pay. After the season when snow storms are likely to occur, the flock must be within reach. They are gotten up from the remote pasture and suffered to run in the fields. But they become breachy and trespass upon neighbors; besides running over the frozen uplands, perhaps already cropped down to the surface by cows, with their close cutting apparatus they pare off all the succulent roots of herds grass, and of course kill it beyond all recovery. The prudent farmer concludes that that this will not do, and so he folds his sheep and begins to feed them hay, perhaps a month before it would be necessary if he had any pasturage for them. In England the farmer has his turnip field, into which he turns his flock during this period, and indeed more or less through the winter, but our climate will not permit us to risk roots in the ground after the first of November. But if clover fields, say when clover is the second year from the seed, and destined to die in the winter, were reserved, and also stubble ground where the new clover and old grain stalks might be cropped with benefit, the manure deposited being worth more than the herbage cropped; these, with wooded pastures where browse could be obtained, would keep the sheep well into December, and later with potatoes, and some fodder if the winter was an open one. To secure the sheep in that part of the field designed for them there should be movable hurdles to put up with stakes. An old-countryman would readily construct these out of our everywhere abundant white birches and poplars; but near a mill or machine shop it seems to me sawed slats, in small rails bored by machinery would be cheaper than the withe hurdles. These would be found very useful in making temporary separations of bucks and lambs from the rest of the flock.

Another item on the debit side of the account of sheep-keeping which may be attacked is the hay bill, which I have reckoned at $10 per ton. Any substitution of equivalent qualities of straw and potatoes, and if you cannot raise them, of turnips or mangolds, by which the farmer can save his hay and save expense, ought to be tried. Pease, with us a sure crop, is a fine feed for the formation of both flesh and wool. On the best German sheep farms a course of fodder, roots and grain is used, variety promoting the health of the animals. The basis of fodder is *straw* rather than hay. My limits will not permit me to furnish here the different quantities of oat straw, barley straw, pease, beans, potatoes, turnips, &c., that have found to be equivalent in value for feeding purposes to one pound of English hay. I doubt however, if there can be much saving. What is valuable *costs*, and without liberal feeding you can produce neither wool nor lambs.

I have discussed this subject thus far solely with reference to small flocks kept on just such pasturage as we now have, and sheltered in our present barns and sheds. It has been my aim chiefly, to show that in keeping large flocks in just such enclosures as we now have in the county, fair profit may be made. But I trust that in some one or more of our towns single individuals or companies may undertake the keeping of sheep in flocks of ultimately not less than 1000. I have computed the cost of the summer pasturage of sheep at 30 cts. per head. This is made up of 6 per cent. of the interest on the land and 10 per cent. of the cost of fences. The latter is the principal item. As soon as the number of sheep becomes so great that the latter item exceeds the summer wages of a shepherd, it will be desirable to dispense with fences and use shepherds and sheep dogs. Such can undoubtedly be procured from Scotland at reasonable wages. A shepherd with a family could carry on the entire business, including the raising of hay and roots, and subsist himself from the products of a large sheep farm. Besides the saving of fences, there would be the saving of manure by the nightly folding of the sheep, upon ground destined for roots or grain, and enclosed with the movable hurdles I have described; and then under the constant attention of shepherds, the losses by dogs, wolves and men would run down to nothing. There are already many establishments of this kind in different parts of the United States, profitably managed. The advantage in climate and cheap lands which Washington county possesses will assure success in such an enterprise, whenever it shall be systematically and judiciously undertaken and persevered in.

Great advantages are justly claimed for the Islands upon our coast, as affording pasturage for sheep through the whole year, with little or no foddering. All such privileges will of course be eagerly improved. But they are limited. Nor can a method of keeping sheep which dispenses with shelter and feeding, be relied upon to produce the highest priced wools, or to realize the greatest profits. The sheep so kept are less prolific, and the tendency is to coarseness of fleece. Besides the sheep soon become wild and many fleeces and sheep are annually lost on account of the difficulty of catching for shearing and for shelter. All writers agree that to make wool, liberal feeding and shelter are requisite. Undoubtedly great profits might be made at first in keeping sheep where neither fences nor barns, nor storehouse nor fodder were required. But an enterprise based upon this method alone would be sure to fail by the degeneracy and running out of the flocks. As auxiliary to an inland sheep farm, an island for the keeping of rams or lambs, or a coast-side pasture, where sheep could be left for the first of the winter, or driven in the spring, would be highly advantageous; and to shift them to the interior as the season advanced, would give that variety of diet so congenial to their best development.

Several gentlemen in different parts of the county have, in answer to written inquiries, favored me with statements of the number, character, yield of wool and lambs, and annual cost of their sheep. From a careful summing up of the facts set forth and averaging the statements, I gather that the best keepers of sheep shear in this county, about $4\frac{1}{2}$ lbs. of wool annually; that they are foddered 140 days upon about 400 lbs. of hay each per head, and yield 75 per cent. of lambs, and that the net profit per head per annum is about $1.

MANURES.

No subject possesses greater interest to the farmer than this, and the present opportunity would be embraced to present a prize essay by Dr. Voelcker, published in the Journal of the Royal Agricultural Society of England, "On the Composition of Farm Yard Manure, and the Changes which it Undergoes on Keeping under Different Circumstances," did not its great length, which is due to the minute scientific detail with which his experiments are related, forbid. We give, however, the conclusions at which he arrived, and these are followed by an extract from another essay upon the same general subject:

Having described at length, my experiments with farmyard manures, it may not be amiss to state briefly the more prominent and practically interesting points which have been developed in the course of this investigation. I would therefore observe:

1. Perfectly fresh farmyard manure contains but a small proportion of free ammonia.

2. The nitrogen in fresh dung exists principally in a state of insoluble nitrogenized matters.

3. The soluble organic and mineral constituents of dung are much more valuable fertilizers than the insoluble. Particular care, therefore, should be bestowed upon the preservation of the liquid excrements of animals, and for the same reason the manure should be kept in perfectly waterproof pits, of sufficient capacity to render the setting up of dung heaps in the corner of fields, as much as it is possible, unnecessary.

4. Farmyard manure, even in quite a fresh state, contains phosphate of lime, which is much more soluble than has hitherto been suspected.

5. The urine of the horse, cow, and pig, does not contain any appreciable quantity of phosphate of lime, whilst the drainings of dung heaps contain considerable quantities of this valuable fertilizer. The drainings of dungheaps, partly for this reason, are more

valuable than the urine of our domestic animals, and therefore ought to be prevented by all available means from running to waste.

6. The most effectual means of preventing loss in fertilizing matters, is to cart the manure directly on the field, whenever circumstances allow this to be done.

7. On all soils with a moderate proportion of clay, no fear need to be entertained of valuable fertilizing substances becoming wasted, if the manure cannot be ploughed in at once. Fresh, and even well-rotten dung, contains very little free ammonia; and since active fermentation, and with it the further evolution of free ammonia, is stopped by spreading out the manure on the field, valuable volatile manuring matters cannot escape into the air by adopting this plan.

As all soils with a moderate proportion of clay, possess in a remarkable degree the power of absorbing and retaining manuring matters, none of the saline and soluble organic constituents are wasted even by a heavy fall of rain. It may, indeed, be questioned, whether it is more advisable to plough in the manure at once, or to let it lie for some time on the surface, and to give the rain full opportunity to wash it into the soil.

It appears to me a matter of the greatest importance to regulate the application of manure to our fields, so that its constituents may become properly diluted and uniformly distributed amongst a large mass of soil. By ploughing in the manure at once it appears to me this desirable end cannot be reached so perfectly as by allowing the rain to wash in gradually the manure evenly spread on the surface of the field.

By adopting such a course, in case practical experience should confirm my theoretical reasoning, the objection could no longer be maintained that the land is not ready for carting manure upon it. I am much inclined to recommend as a general rule: Cart the manure on the field, spread it at once, and wait for a favorable opportunity to plough it in. In the case of clay soils I have no hesitation to say the manure may be spread even six months before it is ploughed in, without losing any appreciable quantity of manuring matters. I am perfectly aware, that, on stiff clay-land, farmyard manure, more especially long dung, when ploughed in before the frost sets in, exercises a most beneficial action by keeping the soil loose and admitting the free access of frost which pulverizes the land,—and would therefore by no means recommend to leave the manure spread on the surface without ploughing it in. All I wish to enforce is, that when no other choice is left, but either to set up the manure in a heap in the corner of the field, or to spread it on the field, without ploughing it in directly, to adopt the latter plan. In the case of very light sandy soils it may perhaps not be advisable to spread out the manure a long time before it is ploughed in, since such soils do not possess the power of retaining manuring substances in any marked degree. On light, sandy soils, I would suggest to manure with well-fermented dung shortly before the crop intended to be grown is sown.

8. Well-rotten dung contains likewise little free ammonia, but a very much larger proportion of soluble organic and saline mineral matters than fresh manure.

9. Rotten dung is richer in nitrogen than fresh.

10. Weight for weight, rotten dung is more valuable than fresh.

11. In the fermentation of dung a very considerable proportion of the organic matters in fresh manure, is dissipated into the air in the form of carbonic acid and other gases.

12. Properly regulated, however, the fermentation of dung is not attended with any great loss of nitrogen nor of saline mineral matters.

13. During the fermentation of dung, ulmic, humic, and other organic acids are formed, as well as gypsum, which fix the ammonia generated in the decomposition of the nitrogenized constituents of dung.

14. During the fermentation of dung, the phosphate of lime which it contains, is rendered more soluble than in fresh manure.

15. In the interior and heated portions of manure heaps, ammonia is given off, but, on passing into the external and cold layers of dung heaps, the free ammonia is retained in the heap.

16. Ammonia is not given off from the surface of well compressed dung heaps, but on turning manure heaps it is wasted in appreciable quantities. Dung heaps for this reason should not be turned more frequently than absolutely necessary.

17. No advantage appears to result from carrying on the fermentation of dung too far, but every disadvantage.

18. Farmyard manure becomes deteriorated in value, when kept in heaps exposed to the weather; the more the longer it is kept.

19. The loss in manuring matters, which is incurred in keeping

manure heaps exposed to the weather, is not so much due to the volatilization of ammonia as to the removal of ammoniacal salts, soluble nitrogenized organic matters, and valuable mineral matters, by the rain which falls in the period during which the manure is kept.

20. If rain is excluded from dung heaps, or little rain falls at a time, the loss in ammonia is trifling, and no saline matters of course are removed ; but if much rain falls, especially if it descends in heavy showers upon the dung heaps, a serious loss in ammonia, soluble organic matters, phosphate of lime, and salts of potash is incurred, and the manure becomes rapidly deteriorated in value, whilst at the same time it is diminished in weight.

21. Well-rotten dung is more readily affected by the deteriorating influence of rain, than fresh manure.

22. Practically speaking, all the essentially valuable manuring constituents are preserved, by farmyard manure under cover.

23. If the animals have been supplied with plenty of litter, fresh dung contains an insufficient quantity of water to induce an active fermentation. In this case fresh dung cannot be properly fermented under cover, except water or liquid manure is pumped over the heap from time to time.

Where much straw is used in the manufacture of dung, and no provision is made to supply the manure in the pit at any time with the requisite amount of moisture, it may not be advisable to put up a roof over the dung-pit. On the other hand, on farms where there is a deficiency of straw, so that the moisture of the excrements of our domestic animals is barely absorbed by the litter, the advantage of erecting a roof over the dung pit will be found very great.

24. The worst method of making manure is to produce it by animals kept in open yards, since a large proportion of valuable fertilizing matters is wasted in a short time; and after a lapse of twelve months, at least two-thirds of the substance of the manure is wasted, and only one-third, inferior in quality to an equal weight of fresh dung, is left behind.

DRAININGS OF DUNG-HEAPS.

Nobody can deny that farm-yard manure is seldom kept in the most efficient manner. In many places in England, especially in Devonshire, and in some parts of Gloucestershire, it is a common practice to place manure-heaps by the roadside, often on sloping ground, and to keep these loosely erected heaps for a considerable length of time, before carting the dung on the field. On other farms, the manure is allowed to remain loosely scattered about in uncovered yards for months before it is removed. Heavy showers of rain falling on manure kept in such a manner, by washing out the soluble fertilizing constituents of dung, necessarily greatly deteriorate its value. It is well known that the more or less dark colored liquids, which flow from badly kept dung-heaps, in rainy weather, possess high fertilizing properties. According to the rain which falls at the time of collecting these drainings, according to the character of the manure, and similar modifying circumstances, the composition of drainings from dung-heaps is necessarily subject to variations. The general character of these liquids, however, is the same in dilute and concentrated drainings. Several samples of dung drainings were recently examined by me, and from this analysis, it will be seen that they contain a variety of fertilizing constituents, which it is most desirable to retain in dung-heaps.

The first liquid examined was collected from a dung-heap composed of well-rotted horse dung, manure from fattening beasts, and the dung from sheep pens. Both the horse dung and the dung from fattening beasts were made in boxes. The liquid which ran from this dung-heap was collected in rainy weather, and contained, no doubt, in addition to the liquid portion of the dung, a good deal of rain.

The amount of free ammonia (ammonia expelled on boiling the liquid) in these drainings was determined in the manner described above; and after the free ammonia was removed, quick lime was added to the remainder of the concentrated liquid, for the purpose of separating any ammonia present in the form of salts, which are not decomposed simply by boiling.

In this way the following results were obtained: One imperial gallon of drainings contained 36.25 grains of free ammonia, and 3.11 grains of ammonia in the form of salts, not decomposed simply in boiling, but by continued boiling with quick lime. Evaporated to dryness, 7,000 grains furnished 65.21 grains of solid matter, dried at 212° Fahrenheit; or one imperial gallon was found to contain 625.10 grains of solid matters. On heating to redness, 65.21 grains left 36.89 grains of ash. This ash was submitted to detailed analysis, and calculated for one imperial gallon of the drainings. According to the analytical results obtained in these different determinations, an imperial gallon of these drainings contained—volatile and combustible constituents, 395.66.

Ammonia driven out in boiling,	36.25	Together 39.36	
Ammonia, in the state of salts, decomposed by quick lime,	3.11		
Ulmic and humic acid,		125.50	
Carbonic acid, expelled on boiling,		88.20	
Other organic matters (containing 3.59 of nitrogen)		142.60	
			395.66
Cineral matters (ash), 368.98, viz:			
Soluble silica,		1.50	
Phosphate of lime, with a little phosphate of iron,		15.81	
Carbonate of lime,		34.91	
Carbonate of magnesia,		25.66	
Sulphate of lime,		4.36	
Chloride of sodium,		45.70	
Chloride of potassium,		70.50	
Carbonate of potash,		170.54	
			368.98
Total per gallon,			764.64

These analytical results suggest the following remarks:

1. It will be seen that these drainings contain a good deal of ammonia, which should not be allowed to run waste.

2 They contain also phosphate of lime, a constituent not present in the urine of animals. The fermentation of the dung-heap thus brings a portion of the phosphates contained in manure into a soluble state, and enables them to be washed out by any watery liquid that comes in contact with them.

3. Drainings of dung-heaps are rich in alkaline salts, especially in the more valuable salts of potash.

4. By allowing the washings of dung-heaps to run to waste, not only ammonia is lost, but also much soluble organic matter, salts of potash and other inorganic substances, which enter into the composition of our crops, and which are necessary to their growth.

II. Drainings from Another Dung-Heap.

These drainings were not so dark colored as the preceding ones. Like the former liquid, it was neutral, but gave off ammonia on boiling, and on addition of quick lime.

Hydrochloric acid produced a dark brown colored, flaky deposit, leaving the liquid only a pale yellow.

The amount of the precipitated humus acid was much smaller than in the preceding liquid.

For want of a sufficient quantity of liquid, only the amount of solid matter contained in it, could be determined.

An imperial gallon on evaporation furnished 353.36 grains of solid matter, dried at 212° Fahrenheit.

III. Drainings from a Third Dung-Heap.

A dung-heap, composed chiefly of mixed fresh horse, cows' or pigs' dung, furnished the material for the third analysis of drainings. This liquid was much darker than the two preceding liquids possessed an offensive smell, although it contained no sulphuretted hydrogen. It was neutral to test paper, consequently did not contain any free or carbonate of ammonia. On heating, ammonia escaped; apparently, however, in much smaller quantities than from the preceding drainings. This liquid was collected at a time when no rain had fallen for several weeks, which circumstance accounts for its greater concentration. It was submitted to the same course of analysis as the first drainings. 7,000 grains evaporated to dryness produced 135.774 grains of dry matter; and this quantity, on burning in a platinum dish, furnished 62.58 grains of mineral matters. A separate portion was used for the determination of the amount of ammonia present in the form of salts; and another portion of liquid, acidulated with a little hydrochloric acid, evaporated to dryness, was employed for the determination of the whole amount of nitrogen. By deducting the amount of nitrogen found in the ammoniacal salts, from the total amount of nitrogen obtained by combustion of the solid matter with soda lime, the proportion of nitrogen contained in the organic substances of these drainings was ascertained. The following table represents the composition of solid substances found in one imperial gallon of draining from fresh manures:

COMPOSITION OF SOLID MATTER IN ONE GALLON OF DRAININGS FROM FRESH FARM-YARD MANURE.

Ready formed ammonia, (principally present,) as humate and ulmate of ammonia,	15.13
Organic matter,	716.81
Inorganic matters (ash)	625.80
Total amount of solid matter in one gallon of drainings,	1357.74
Containing nitrogen,	31.08
Equal to ammonia,	37.73
625.80 of ash consisted of:	
Silica,	9.37
Phosphates of lime and iron,	72.65
Carbonate of lime,	59.58
Sulphate of lime,	14.27
Carbonate of magnesia,	9.95
" potash,	297.38
Chloride of potassium,	60.64
" sodium,	101.82

It will be observed that these drainings contain about double the amount of solid matter which was found in the liquid from the first heap. The composition of this solid matter, compared with that of the solid matter in the liquid from the first heap, moreover, presents us with some particulars to which it may be advisable briefly to allude.

In the first place, I would remark, that notwithstanding the greater concentration of the third liquid, as compared with the first, the proportion of ammonia present in the form of ammoniacal salts was less, while the drainings from fresh dung contained the larger portion of this element in the form of soluble organic substances. The most important constituent of farm-yard manure, *i. e.*, nitrogen, is thus liable to be wasted in the drainings, whether they proceed from rotten or fresh manure, for in either case it passes off in a soluble state of combination. While speaking of the nitrogen in the drainings of dung-heaps, I ought to mention that in both the liquids examined in detail, I have detected readily the presence of nitric acid. In the liquid from fresh manure there were apparently mere traces of nitrates, but in that from rotten dung the proportion of nitric acid was so considerable that I hoped to be able to determine it quantatively. But I found the large amount of soluble organic matter to interfere sadly with the nitric acid determination; and unable to supply for the present correct results, I merely mention the fact that these liquids contained nitrates, and trust to be able to supply this deficiency in these analyses at a future period. In the next place, I would observe, that the proportion of organic and inorganic matters bear to each other different relations in the first and in the third liquid.

In the liquid from rotten dung, the proportion of mineral matter exceeds that of organic substances, and, in the third liquid, the reverse is the case. We learn from this that soluble organic matters are very liable to become decomposed; and it is not unlikely that all putrescent organic matters, before assuming a gaseous state, are first changed into soluble matters.

In the first stage of decomposition, *i. e.*, during the active fermentation of dung, the constituents of farm-yard manure are rendered more and more soluble; hence, up to a certain point, the amount of soluble organic matters increases in manures But when active fermentation in manure heaps becomes gradually less and less energetic, and finally ceases, the remaining fermented manure is still liable to great and important changes, for it is subject to that slow but steady oxidization or slow combustion, which has been termed appropriately by Liebig, Eremacausis. To this process of slow oxidation all organic substances are more or less subject. It is a gradual combustion which terminates with their final destruction.

Hence the larger portion of organic matter in the liquid from the manure heap formed of fresh dung in an active state of fermentation, and the smaller portion of organic matter in the drainings of the first heap, in which the dung had passed the first stage of decomposition, and been exposed for a considerable period to the subsequent process of eremacaucis or slow combustion. The formation of nitric acid from putrefying organic matter has long been observed, but the exact condition under which it proceeds, are by no means satisfactorily established, and much room is left to further extend investigations.

The mineral substances in the drainings from fresh dung are the same as those from rotten. Like the ash of the latter, the liquid from fresh dung-heaps contains soluble phosphates, soluble silica, and is rich in alkaline salts, especially in carbonate of potash, of which there are nearly 300 grs. in a gallon of the liquid. Sufficient evidence is thus presented in the analysis of these liquids, that as the drainings of both fresh and rotten dung-heaps are allowed to flow into the next ditch, concentrated solutions of the most valuable constituents of dung are carelessly wasted.

With a view of preventing such a serious loss, I have suggested the propriety of carting the manure on the fields, whenever practicable, in a fresh state, and of spreading it at once. It may be objected that the application of manure in a fresh state, equivalent to winter manuring, and especially the spreading of dung, will lead to waste, inasmuch as the rain which falls during the winter and spring has much more chance of washing out fertilizing substances from the dung than by applying it at the time of sowing. This objection would indeed be a valid one, if we were not acquainted with the fact that all soils containing a moderate proportion of clay possess the property of retaining the more valuable constituents of manure; but, this being the case, the objection on these grounds cannot be admitted. With more force, however, it may be made with reference to light sandy soils, and it is indeed upon such soils that manure is best applied in spring.

In order to ascertain to what extent various soils possessed the powers of absorbing manuring constituents from the drainings of dung-heaps, I determined to employ a limited quantity of soil and a large excess of liquid. To this end, two parts by weight of liquid were well mixed with one part by weight of soil, and left in contact with the latter for twenty-four hours, after which the clear liquid was drawn off and passed through a filter.

Experiments to Ascertain the Extent of Absorbing Properties of Soils of Known Composition.

Experiment made with the drainings of dung-heaps composed of rotten dung. The drainings employed in this experiment were the same which contained in the imperial gallon 664.64 grains of solid matter, the detailed composition of which is given above. The composition of the soil used in the experiment is given below.

The surface-soil contained a good deal of organic matter, a fair proportion of clay, little sand, and a moderate proportion of carbonate of lime in the form of small fragments of limestone. It was a stiffish soil, belonging to the clay marls. Its subsoil was richer in clay and of a more compact texture and less friable character than the surface-soil. The mechanical analyses of soil and subsoil gave the following result:

	Surface-soil.	Subsoil.
Moisture when analyzed,	5.66	3.66
Organic matter and water of combination,	25.86	8.79
Lime,	14.30	26.03
Clay,	34.84	56.76
Sand,	19.64	4.76
	100.00	100.00

In the chemical analysis of this soil, the following results were obtained:

	Surface-soil.	Subsoil.
Moisture when analyzed,	5.36	3.66
Organic matter and water of combination,	25.86	8.79
Oxides of iron and alumina,	13.88	10.13
Carbonate of lime,	14.30	26.03
Sulphate of lime,	.56	Not determined.
Phosphoric acid and chlorine,	traces.	
Carbonate of magnesia,	1.04	1.67
Potash,	.07	
Soda,	.18	
Insoluble silicious matter,	38.74	49.73
	100.00	100.00

2,000 grains of this soil and 2,000 grains of subsoil were mixed with 4,000 grains of the liquid from rotten dung. After twenty-four hours the clear liquid was carefully drawn off and filtered. Its original dark-brown color was changed into a pale yellow color. This soil thus possessed in a high degree the property of decolorizing dark-colored liquids like the washings of dung-heaps.

1,200 grains of the filtered liquid, passed through soil, were distilled in a retort nearly to dryness, and the ammonia which was given off carefully collected in an apparatus containing hydrochloric acid, and so constructed as to secure the perfect absorption of ammonia.

The amount of chlorine of ammonia obtained on evaporation of the acid liquid in the receiving vessel was 62 grains. This gives for one imperial gallon of liquid passed through soil, 11.49 grains of ammonia.

Originally the drainings contained, per gallon,	39.36
After filtration through soil they contained, per gal.,	11.49
Absorbed by 70,000 grains of soil,	27.87 am.

1,000 grains of this soil, thus absorbed 396 of ammonia.

On evaporation of another portion of the same liquid passed through soil, one imperial gallon of filtered drainings was found to contain 164.88 of organic matter ; 210.20 of inorganic matter.

Before filtration through soil, the imperial gallon contained 268.10 grains of solid organic substances ; 368.98 of mineral matters.

A considerable quantity of both organic and mineral matters thus removed from the liquid in contact with the soil.

A similar experiment was made by diluting 4,000 grains of the same drainings with 4,000 grains of distilled water, and leaving the more dilute liquid in contact for twenty-four hours with 2,000 grains of the same soil, and 2,000 of subsoil.

The filtered liquid contained in the gallon :

Ammonia,	6.91
Organic matters,	118.50
Mineral matters,	147.36
Total amount of solid matters in a gallon,	272.77

The 147.36 of mineral matters (ash) consisted of:

Silica,	2.38
Phosphates of lime and iron,	1.54
Carbonate of lime,	79.72
Carbonate of magnesia,	6.17
Sulphate of lime,	7.92
Chloride of sodium,	18.90
Chloride of potassium,	26.44
Carbonate of potash,	4.29

Originally the liquid employed in this experiment contained 19.68 grains of ammonia to the gallon. After passing through half its weight of soil, it contained only 6.91 grains of ammonia ; consequently 12.77 were retained by 35,000 grains of soil, and 1,000 grains of the same soil absorbed 396 grains of ammonia. In both instances it was thus found that rather more than two-thirds of the amount of ammonia present in these drainings, in the form of ammoniacal salts, were retained by a very limited quantity of soil. I have purposely used a large amount of liquid in comparison with that of soil. If, under such conditions, the soil is capable of retaining two-thirds of the whole amount of ammonia present in a liquid like the one examined, it is not too much to expect that no ammonia whatever will be lost in practice by carting manure on the fields in autumn, and spreading it at once. The quantity of soluble ammoniacal matters in a heavy dressing of the best dung does not amount to many pounds, and such a quantity, in relation to the weight of the soil ready to take up ammonia from the manure, is so insignificant that the most scrupulous may rest satisfied that in a soil containing even a small proportion of clay no ammonia will be lost by dressing the fields in autumn.

Other no less important changes than those referring to the absorption of ammonia will strike the reader to have taken place in these drainings left in contact with the soil. For better comparison sake, I will give the composition of the drainings before and after passing through the soil, and then make a few additional remarks which are suggested by such a comparison.

Composition of Drainings from Rotten Dung.

One imperial gallon contains :

	Before filtration through soil.	After filtration.
Ammonia (in the form of ammoniacal salts),	19.68	6.91
Organic matter,	134.05	118.50
Silica,	.75	2.38
Phosphate of lime and iron,	7.90	1.54
Carbonate of lime,	17.46	79.72
Sulphate of lime,	2.18	7.92
Carbonate of magnesia,	12.83	6.17
Chloride of sodium,	22.85	18.90
Chloride of potassium,	35.25	26.44
Carbonate of potash,	85.27	4.29
	338.22	272.77

It will be observed that this liquid, in passing through the soil, has undergone a striking change. Leaving unnoticed several minor alterations in the composition of the original liquid, I would direct special attention to the very small proportion of carbonate of potash left in the draining after contact with this soil. It will be seen that, out of eighty-five grains of potash contained in the original liquid, no less than eighty-one grains have been retained by the soil. This is a result of the greatest importance, inasmuch as it shows that the soil possesses, in a remarkable degree, the power of removing from highly mixed manuring substances, not only ammonia from ammoniacal salts, but also the no less important soluble potash compounds. According to this result, 1,000 grains of soil absorb no less than 2,313 grains of carbonate of potash.

But, in addition to carbonate of potash, a considerable quantity of chloride of potassium is retained in this soil by passing the washings from rotten dung through it; for it will be observed that nearly nine grains of this salt, or, in exact numbers, 8.81, were retained in the soil.

The avidity of the soil for soluble salts of potash is the more remarkable, as it offers a striking contrast to the apparent indifference in this soil to absorb soda from its soluble combinations; for it will be seen that the liquid, after filtration through the soil, contains only about four grains less of common salt in the gallon than before filtration.

In a purely chemical point of view, soda salts are closely allied to salts of potash, and yet there is a marked difference observable in the power of this soil, at least, to absorb the one or the other alkali.

As regards the practical effect which salts of soda and potash are capable of displaying with reference to the nutrition of plants, the former are not to be compared to the latter in point of efficacy. It was believed at one time that soda was capable of replacing potash in the ashes of our crops, but this opinion was not based on trustworthy evidence. On the contrary, the best and most extensive series of ash analyses of our crops show that while the amount of potash, within certain limits, is constant in the ashes of plants, that of soda, especially of chloride of sodium, is liable to great fluctuations, arising, no doubt, from local conditions of the soil.

The fact that soils are capable of absorbing potash from soluble manuring matters, while no special care is manifested by them to retain the equally soluble soda salts, appears to me to account, to some extent at least, for the comparative constancy of the amount of potash in the ashes of our crops, as well as for the fluctuations of the amount of soda in the same. The power of soils to retain potash in large proportions must have the effect of converting the salts of potash in the manure applied to the land into compounds, which, though not altogether insoluble in water, are yet sufficiently difficult of solution to permit only a limited and fixed quantity to enter into the vegetable organism in a given period. The case is different with salts of soda; for as soils do not appear to retain them in any high degree, and plants have no selecting power, but appear to absorb by endosmosis whatever is presented to the spongioles of their roots in a state of perfect solution, it is evident that more soda will enter into the plants when grown on a soil naturally abounding in this alkali or heavily dressed with common salt, than when grown upon a soil poorer in soda.

We have here at the same time an interesting illustration of the fact that the soil is the great workshop in which food is prepared for plants, and that we can only then hope to attain unto a more perfect knowledge of the nutrition of plants, and the best means of administering to their special wants, when we shall have studied, in all their details, the remarkable changes which we know, through the investigations of Mr. Thompson and Professor Way, take place in soils when manuring substances are brought into contact with them. The subject is full of practical interest, but also surrounded by great difficulties, which, it appears to me, can only be overcome when the investigation is taken up in a truly scientific spirit, without reference to the direct application which, in due course, no doubt, well established chemical principles will receive in agriculture. It is the undue anxiety to obtain at once what is properly called a practical result—the grasping after results which may at once be translated into so many bushels of corn—which is a great hindrance to the more rapid advancement of agricultural science; and it is to be hoped, for the sake of the true interests of the really practical man, that the voice of those capable of understanding and appreciating purely scientific results, will be sufficiently powerful to keep in check the too great anxiety for immediate results.

In the next place, I beg to direct attention to the absorption by the soil of the phosphates contained in drainings. If it is borne in mind that the soil and subsoil with which the liquid was brought into contact, contained a large excess of carbonate of lime, it is not more than would naturally be expected, if we should see the soluble phosphates of the original drainings converted by the carbonate of lime into insoluble compounds.

Having already remarked upon the power of this soil to retain ammonia, I beg, in conclusion, to point out the large quantity of carbonate of lime in the filtered liquid as worthy of notice. This large amount of carbonate of lime is easily explained by the presence of much lime in the soil. Before filtration the liquid contained only about 17½ grains of carbonate of lime, and after filtration as much as nearly 80 grains. Thus while potash and ammonia are absorbed by the soil, lime is dissolved and passes into the liquid, which is filtered through the soil. Not only is the quantity of carbonate of lime considerably increased in the filtered drainings, but that of sulphate of lime in a minor degree also.

It is highly satisfactory to me to find the observations of Professor Way, with respect to the relative power of soils to retain ammonia, potash, soda and lime, confirmed in my experiments with a liquid containing a number of fertilizing agents required by our crops.

Before describing the next filtration experiments, I may state that I have thought it a matter of some interest to examine what amount of solid organic and inorganic matter to a given quantity of pure water would dissolve from the soil, the composition of which has been stated above. Accordingly, one part by weight of subsoil, and one part of surface-soil, were mixed with four parts by weight of distilled water, and the whole being occasionally stirred up, left to subside for twenty-four hours, after which time the water was filtered from the soil, and carefully analyzed.

An imperial gallon of this water was found to contain 84.88 grains of dry residue (dried at 220° Fah.), consisting of—

Organic matter, and a little water of combination,	48.00
Carbonate of lime,	26.84
Sulphate of lime,	5.73
Phosphate of lime, with a little oxide of iron,	.65
Carbonate of magnesia,	.50
Chloride of sodium,	1.25
Potash,	.99
Silica,	.92
	84.88

The amount of organic matter in this water is very great; it arises from the great excess of decomposing organic remains in the soil, and imparted to the water a yellow color, and disagreeable smell, not unlike the smell of water in which flax is steeped.

It will be further observed, that even pure rain water is capable of rendering soluble a considerable quantity of all those mineral constituents which are found in the ashes of our crops, and therefore are necessary to their growth.

2. *Filtration experiment made with the drainings of a dung-heap composed of fresh mixed farm-yard manure.* Having ascertained in the previous filtration experiments, that a soil containing a good deal of clay and lime is capable of removing from compound manuring substances all the more valuable fertilizing constituents, I was anxious to determine to what extent soils deficient in both clay and lime, possessed the property of retaining fertilizing substances from the drainings of dung-heaps. The composition of the liquid used for this experiment is given above; it is the same liquid collected from a fresh dung-heap, which in a gallon contained 1,357.74 grains of solid matter. The soil selected for experiment was a light, sandy, red-colored, very porous soil, containing, as will be seen by the following analysis, only little clay, and still less lime, but a good deal of organic matter. It was submitted to a minute and careful mechanical and chemical analysis and furnished the results embodied in the subjoined tables:

I. Mechanical Analysis.

Moisture,	3.45
Organic matter, and water of combination,	13.94
Coarse, white, quartz sand,	47.00
Fine, red sand, and a little clay deposited from water on standing five minutes,	19.82
Coarse clay, deposited on standing ten minutes,	2.82
Fine clay, deposited from water on standing one hour,	6.30
Finest clay, kept in suspension in water, after standing longer than one hour,	6.67
	100.00

It appears from these results, that nearly half the weight of this soil consists of pure white, coarse, quartz sand, which can be readily separated by washing. The deposit which settled from water, after five minutes standing, consists chiefly of fine, red sand, mixed with very little clay. The remainder is clay in a very finely subdivided state, besides humus and some water of combination. The result of the mechanical examination thus shows that the proximate constituents of this soil are present in an advanced state of decomposition. In the following tabular statement, the minute chemical composition of the same soil is given:

II. Chemical Analysis.

Moisture,		3.45
*Organic matter, and water of combination,		13.94
†Carbonate of lime,		.31
†Sulphate of lime,		.53
(Containing S. O.3	.37)	
Alumina,		14.74
Oxide of iron,		5.87
Magnesia,		.18
Potash, (in a state of silicate)		.25
Chloride of sodium,		.11
Phosphoric acid, combined with iron and alumina (equal to bone earth, 131)		.061
Soluble silica (soluble in dilute potash)		7.42
Insoluble silicious matters, (almost entirely white sand)		53.32
		100.181
*Containing nitrogen,		.192
Equal to ammonia,		.228

5,000 grains of this soil were mixed with 5,000 grains of liquid from a fresh manure heap, and 5,000 grains of distilled water. After twenty-four hours, the clear liquid was filtered from the soil, and found to be somewhat lighter colored than before; but, in comparison with the decolorizing properties of the clay soils, used in the experiment, with the drainings from rotten dung, its effect upon the dark-colored organic compounds in the liquid, appeared to be weak.

A portion of the filtered liquid was used for the determination of the ammonia contained in it, in the form of volatile salts, or, at any rate, in the form of salts, which yield ammonia on boiling their watery solution.

Another portion was evaporated to dryness, and the amount of nitrogen in the dry residue determined. The rest of the liquid was used for the determination of solid matter and ash.

Leaving unnoticed the details of these various determinations,

† Containing together .39 of lime.

I shall state at once the composition of the drainings passed through this light sandy soil. I may observe, however, that the ammonia and nitrogen, as well as the total amount of solid matter and ash in it, were determined twice, and closely agreeing results were obtained. An imperial gallon of liquid from fresh manure passed through red sandy soil, contained:

Ready formed ammonia (chiefly as ulmate and humate of ammonia),		7.13
*Organic matter,		301.70
**Inorganic matter (ash)		245.70
Total amount of solid matter per gallon of liquid,		554.53
Containing nitrogen,	12.60	
Equal to ammonia,	15.30	

The ash (245 grains) consisted of:

Silica,	15.08
Phosphate of lime and iron,	33.14
Carbonate of lime,	21.22
Sulphate of lime,	trace.
Carbonate of magnesia,	2.36
Carbonate of potash,	85.93
Chloride of potassium,	39.49
Chloride of sodium,	48.48

It appears distinctly from these results that this soil possessed the power of absorbing manuring matters in a much smaller degree than the stiffer soil used in the preceding experiment. This agrees well with previous observations, in which it was found that soils in which sand greatly preponderates, exhibit these useful absorbing properties in the least, and others in which clay preponderates, in the highest degree.

The soil used in the last experiment, it is true, contains a fair proportion of alumina; but this alumina exists principally in a free state, or, at all events it is so loosely united with silica that it can be easily separated from this combination by dilute acids. The absorbing properties of soil, it thus appears, do not depend so much on the alumina contained in soils in a free state, but as shown already by Professor Way, rather in peculiar combinations, into the composition of which alumina enters. It is more than probable likewise, that the different agricultural clays contain double silicates, to which Professor Way refers the absorbing properties of soils, in very variable proportions, and that consequently the agricultural capabilities of soils, so far as they are dependent upon these important properties, can not merely be ascertained by determining the proportion of clay which they contain. In short the mere analysis of soils is not calculated to give us a fair idea of their true characters; nor does it appear to me to afford sufficient indications of what is really wanting in a soil in order to make it yield up heavy crops.

The nature of the changes which these drainings from fresh farm-yard manure underwent in contact with the soil, the analysis of which has just been given, will appear by glancing at the subjoined diagram, in which the composition of these drainings is stated before and after filtration through soil. An imperial gallon of liquid contained:

	Before filtration through soil.	After filtration.
Ready formed ammonia,	7.67	7.13
Organic matters,	358.40	301.70
Inorganic matter (ash)	312.90	245.70
Total amount of solid matter per gallon,	678.97	554.53
Containing nitrogen,	15.54	12.60
Equal to ammonia,	18.86	15.30
Silica,	4.75	15.08
Phosphate of lime and iron,	36.32	33.14
Carbonate of lime,	29.79	21.22
Sulphate of lime,	7.14	trace.
Carbonate of magnesia,	4.98	2.36
Carbonate of potash,	148.69	85.93
Chloride of potassium,	30.32	39.49
Chloride of sodium,	50.91	48.48
**Total of ash,	312.90	245.70

The amount of ready-formed ammonia retained by this soil, it will be seen, is very trifling indeed; nor is the proportion of nitrogen, which is retained in the soil in the form of nitrogenized organic matters, very great. We are thus presented here with an instance, showing clearly that there are soils which do not possess the power of absorbing ammonia in any marked degree. In the case of such soils as the one used in this experiment, I think it would be hazardous to apply the manure in autumn. I may also mention a curious circumstance in connection with this soil. I am informed that guano and ammoniacal manures do not seem to do much good on this soil, while the application of niter is followed with marked effect.

The most decided change in the composition of this liquid is observable in the proportion of potash which is contained in the filtered liquid ; for, as in the case of the former soil, a considerable quantity of this alkali has been absorbed by the sandy soil. On the other hand, there is only a trifling amount less chloride of sodium in the liquid after than before filtration, thus affording another proof that the power of soils to absorb potash is much greater than to retain soda. It will likewise be observed that, instead of yielding carbonate of lime to the liquid which was brought into contact with the light soil, some carbonate of lime and all the sulphate of lime were actually retained. This soil, it will be remembered, is deficient in lime. Perhaps it may not even contain sufficient to supply the wants of some crops, and seems to be endowed with the property of absorbing lime from manuring matters, affording thereby an interesting instance how special provision is made in soils for the absorption of those constituents which are naturally deficient in them, and which are required in considerable quantities for the healthy and luxuriant growth of our crops.

In the preceding experiment, just the opposite took place ; for it will be remembered that the drainings, after passing through the calcareous clay soil, contained a great deal more of lime than before filtration. Similar differences will be observed with respect to other constituents originally present in the liquid, and retained in the stiff and in the sandy soil in very different proportions. I abstain from noticing any minor changes in the composition of the filtered liquid, nor shall I indulge in any speculations respecting the compounds in the soil which have contributed to these changes and the new combinations in the soil which may have resulted from them. Our present knowledge on the subject is far too imperfect to warrant us to theorize profitably on these matters ; I therefore prefer to send forth for the present my analytical results without any further comment, and conclude by expressing the hope that I may be permitted to continue similar inquiries into the physiology of soils, and do not doubt that great and important practical benefits will, in due course, be derived from increased knowledge of the properties of soils and the changes manuring matters undergo when in contact with them.

The valuable papers given below, by Professor Johnson of the Agricultural Department of the Sheffield Scientific School, Yale College, New Haven, first appeared in the columns of the "Country Gentleman" during the present year. They have deservedly attracted much attention and have been copied into the leading Agricultural Journals of Great Britain, but nowhere will they be read with greater interest and profit than here, where the potato is not only the leading root crop, but a staple article of export also:

THE TRUE CAUSE OF THE POTATO DISEASE.

BY PROF. S. W. JOHNSON.

Our heading reads the *true cause* for the reason that so many false causes have been laid at the foundation of this disease, that to say simply *the cause*, would merely imply another, no better, perhaps worse, than those already familiar to the reader and alike unsatisfactory.

But why is it that we have had so many causes for this disease? It is on account of the difficulty of investigating the matter. Strange as it may appear, the true cause is the one suggested first of all, nearly as soon as the evil showed itself. It was not however, *proven* to be the cause. The earliest observers saw the cause, described it, figured it and gave their opinion that it produced the disease, but did not demonstrate the fact. That a parasitic fungus or mould plant was always associated with the potato rot, was the first microscopic observation made. But to the suggestion that it caused the decay of the potato, it was replied by Liebig and his school, the fungus is not the cause but the result of the decay. Liebig's theory of decay and fermentation, at that time a new, plausible, and incontrovertible theory, did not allow a fungus to originate a rot, but only to feed upon it. To this, the fungus theorists made but lame replies, and other "causes" were shortly discovered in appalling numbers. Smee found a sort of a louse or aphis grazing among the fungi, and he decided it to be the cause.

Some thought the potato had "run out," had lost its original vigor of constitution from long cultivation, and thus fell an easy prey to parasites that could do no damage to a healthy plant. Others said that the long-continued propagation from the tubers (buds) had undermined the health of the potato—like breeding in-and-in had developed a kind of scrofula—and the plant must be reproduced from the seed, which was done without such success as would be needful to sustain that theory of the disease.

Some thought too high feeding, especially of nitrogenous manures, spoiled the potato. Others ascribed the disease to absence of salt. Others to bad, wet weather, wet and warm weather stagnating the juices. Others thought the potato rot was connected with cholera, with want of ozone, &c., &c.

All these theories were sustained by various arguments and facts but none of them explained everything, and the wisest were bold enough not to know what the true cause might be. Then, as to the remedies, every day brought forth the cure, but no one cured twice.

At last the genuine cause has appeared, and what is it? Why, the fungus! But we gave that up years ago! Well, we must take it again; it is the true cause! Beyond all reasonable doubt, it is proved that the potato never rots without the fungus, and that it always rots with it. Planting the fungus on a sound potato develops the disease. Shielding the potato from the fungus prevents the disease. The rot starts where the fungus begins to grow. Each microscopic cell of the tuber becomes discolored and rotten, when, and only when the fungus issues its branches into it, or into its immediate neighborhood. Constitution, tuber, propagation, aphides, salt, manures and weather, have nothing to do with the disease, except as they favor or destroy the fungus.

This is a grand result if true. After carefully studying the evidence, it is hard to reject the doctrine. Let us examine the evidence and judge for ourselves.

As is well known, the first indication of potato disease is the blight of the leaf. This comes on so suddenly and often so peculiarly, as to point with the utmost directness to a fungus as its cause. That a fungus is developed on and in the blighted leaf, is perfectly understood, and has been from the first. To prove that this fungus invariably precedes, and is immediately followed by the blight, is the capital achievement lately made by Dr. Speerschnieder, and confirmed by Kuhn and De Bary, botanists of Germany. These investigators have not merely looked at the blighted leaves and seen the fungus there, but have watched the fungus as it rapidly sends out its branches into the still fresh and healthy portions of the leaf, and literally devours them, appropriating their juices to its own nourishment, and leaving behind a disorganized and decayed mass as the track of its desolation. It is easy to see with the unaided eye, that the fungus travels over the potato leaf *before* the blight. If the observer carefully regards one of the brown blight-spots when the disease is spreading, he will see that at its borders, and extending over upon the still green leaf, is a forest of tiny mould-plants which cover the leaf with a greenish down. This is the potato fungus, the *Peronospora infestans*, as it is now botanically designated.

The manner of growth of this plant must be known before one can understand its effects. It comes from a seed or spore of microscopic dimensions, a minute, oval, somewhat flattened body, which bears at either extremity a hair-like prolongature. These spores are produced to the number of 12—16, together, in a spore-sack at the extremity of a branch of the fungus. They are kept in a peculiar rapid motion by the vibration of the hair-like appendages, and when ripe they burst the spore-sack and are discharged. Their motion continues about half an hour, when it becomes slower and shortly ceases. Then the spore begins to change its figure, the hairs disappear, and shortly a thread-like branch begins to protrude from its side; this rapidly increases, and if the spore is upon the potato plant, the branch, which is the seedling fungus, so to speak penetrates the tissues of the potato,—leaf, stem or tuber as the case may be,—and forthwith commences its parasitic life. The young fungus buds out in various directions, sending into the juices and cells of the potato, its feeding branches or *mycelium*; while other, or fruit branches, pass out into the atmosphere, and reproduce spores with marvellous fecundity. The growth of the mother plant continues as long as it finds food, and the requisite warmth and moisture. When the supplies existing in one place are exhausted, the plant dies in that spot; but the branches, which had previously extended into the neighboring regions, continue to grow, so that the devastations of this fungus are like a fire which spreads in all directions wherever it finds fuel.

Nothing can explain the fact that a field which yesterday was green, and to all appearance healthy, to-day is black with blight, except the most magical increase of this parasite. Nothing else can enable us to comprehend how a part of the field—a streak across it—is blighted, while the rest is undamaged.

De Bary has produced the blight on healthy potato leaves by sowing the spores and causing the "fungus" to develop on them. To accomplish this it is only necessary to bring a spore in a droplet of water that is stationed on a bit of potato leaf, or to keep the spore and the leaf in a sufficiently moist place for a few hours, to see with the microscope the fungus develop and the leaf turn yellow and finally brown, with all the symptoms that are observed when the disease is taken in the natural way. By these observations and experiments it appears proved beyond all cavil, that the *Peronospora infestans* is the cause of the leaf blight, which is the invariable precursor of the rot of the tuber.

The question next comes up: What has the fungus to do with the rot itself—with the potato disease proper?

On this point the evidence is no less conclusive. Dr. De Bary* describes the following simple experiment, which demonstrates that the tuber rot is the work of the fungus. A perfectly healthy potato is well washed and cut into halves. Each half is placed in a separate saucer, with the cut surface uppermost, and is covered with a tumbler or bell-glass, to protect it from dust and disturbance. A little pure water is placed in each saucer to keep the potato from drying away.

Upon the cut surface of one of the pieces a number of spore-sacks of Peronospora are scattered, care being taken that none shall get across to the other piece. Both are now left to themselves, protected by the bell-glasses, and under the same conditions of temperature, moisture, &c. In ten or more days, according as the weather is warmer or cooler, the experimenter may observe that the half upon which the spores were sown, begins to exhibit decided symptoms of the disease, while the other half remains perfectly healthy. The symptoms are precisely those which are always observed in the potato rot. The surface of the tuber first turns brown at the points where the spores were deposited; the discoloration extends outward from these spots in all directions, and in a few days the whole section is brown to the average depth of one-

* In his work, "Die gegenwaertig herrschende Kartoffel-Krankheit; ihre Ursache und ihre Verhuetung.

half to one line. The change proceeds from the edges of the cut surface under the skin of the tuber, until the whole mass is enveloped in a brown coating.

The disease penetrates deeper and deeper into the tuber, until the latter is completely infected. If much moisture be present, the mass dissolves to a dark, foul liquid; otherwise it dries away and shrivels together, as happens in the diseased potatoes in a dry cellar.

On the section of the inoculated half, patches of mold appear as the discoloration commences. These extend rapidly, and when magnified are seen to be the fruit bearing branches of the fungus. They break out also through the skin after the parts underlying have become brown by the ravages of the mycelium.

With the other half of the potato, matters have gone on very differently. A discoloration is indeed noticeable at first; but it is slight, and is due to the formation of a new skin. In a short time the wound heals over, and thenceforth no further change happens, though months elapse, except such as would occur with sound uncut potatoes under the same circumstances. The same result follows when a potato is sown with spores, and buried in moist earth. It is not needful that the spores be applied to a cut surface. The fungus when it begins to grow, will penetrate the potato skin without difficulty. About a week is required for the disease to become evident.

These facts, which Speerschnieder and De Bary have repeatedly verified, and which any one may observe without difficulty, illustrate the manner in which the rot in the tuber is a consequence of the blight of the leaf. The spores which fall from the mature fungus that is on the leaves, are carried by rains down into the ground, and reach the tubers, provided the latter are not too deep-lying, and thus infect them. If the soil of a field that is brown from blight, be examined microscopically, there is no difficulty in finding spores among the particles of earth.

A simple experiment furnishes proof that this is the actual process. De Bary buried potatoes in sand from one-half to three inches deep, laid blighted potato tops on the surface of the sand, and sprinkled the whole moderately with water: in all cases the potatoes thus treated became diseased within eleven days. It is hardly necessary to state that to make these experiments conclusive, other potatoes were treated similarly in all respects, save that they were not treated with fungus spores, and that they invariably remained healthy.

De Bary describes the precautions which are needful to be observed in order to find the Peronospora in *every potato that is infected with the rot.* The difficulties in the microscopic examination of the diseased potato have prevented many skilled observers from tracing the disease to its true cause; but with proper care it is easy to demonstrate beyond all question that *where this fungus is, there is potato disease, and where the disease is, there is this fungus.*

We must reserve for another article an account of the means to resist the ravages of the Peronospora infestans.

Sheffield Scientific School, of Yale College, Jan., 1863.

Having given an account of the potato fungus, *Peronospora infestans,* and described the experiments and observations which have been adduced as evidences that it is the cause, and not a result of the potato rot, we may now turn our attention to an important question that presents itself, viz: How is the existence of the fungus continued from year to year? This point appears to have been thoroughly investigated by Dr. De Bary. He describes at length the researches which conduct him to the following results: 1st. The spores or seeds of the fungus cannot survive the winter either on the dry potato top or in the soil. 2d. The Peronospora infestans is not developed from the spores of any other form of fungus. It happens that some fungi are propagated by two or more distinct kinds of spores, some of which may be kept in the dry state indefinitely, without losing their vitality. It was hence necessary to examine most carefully the habits and development of all the fungi, which usually occur on potatoes. The result of such study is that none of them have any generic connection with the potato fungus. This feeds upon the *sound* potato, the others feed upon the *decayed* potato. 3d. The Peronospora infestans winters in the tuber in the condition of *mycelium,** and is carried into the field in seed potatoes. We have not space here to detail the evidence in favor of these conclusions, but must refer to De Bary's work. With regard to the last, however, it may be remarked that

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* The sterile fungus which yields no spores.

there are two methods by which the fungus that is contained in the seed potato may propagate after the latter is planted, and thus from a single infected tuber may devastate a whole field or neighborhood:

1st. As has been described in the previous article the potato containing the mycelium (fungus without seed or spores) in its interior, if cut or bitten so that the cuticle is injured over the diseased part, shortly produces, under favorable conditions of moisture and warmth, spore-bearing branches, which multiply and produce new fungi. In a stiff soil, at a considerable depth, and in case of uncut or unwounded tubers, this kind of propagation by spores does not take place.

2d. The mycelium, which has lain dormant in the tuber during the winter, and has perhaps developed in it to so slight a degree as to escape ordinary observation entirely, grows in the planted tuber, follows the young shoots in their extension, and with them passes out of the soil. When the mycelium enters a young shoot in large quantity, the latter shortly becomes black and dead Such shoots may often be observed when diseased tubers are allowed to sprout. On the contrary, if the mycelium is not abundant, the shoot preserves its beautiful appearance externally, and grows without any perceptible drawback, although on microscopic examination the mycelium may be found, as well as the discolored track of disorganized tissue through which it has made its way.

Considering the facts stated in our previous article, it is evident that proof being given that the mycelium may survive winter in the tubers, from them penetrate the shoots, and thus get above the soil, it must be admitted as a consequence, that a few diseased seed potatoes may infect a whole field more or less widely, according as the conditions of increase or distribution are favorable or otherwise.

When a young shoot containing the fungus in large quantity has grown a few inches above the soil, it will as experiments demonstrate, shortly suffer discoloration and afterwards perish. These instances of potato disease in the early summer attract little or no attention, because they are not numerous, and because the diseased shoots are surrounded and hidden by healthy ones, which may have issued from the same tuber. If now moist and warm weather ensues from the surface of the shoot which is blackened by the ravages of the mycelium, there arises a forest of fertile fungi, which within 15 to 18 hours, developes an abundant crop of spores. From this insignificant beginning may spring the most destructive results, as will be plain when we consider the number of spores which are produced, the ease with which they are detached from the spore sacks, the fact that they retain their vitality for several weeks, and the extraordinary rapidity with which they reproduce new generations of fungi.

The rapidity with which the *Peronospora infestans* propagates from the mycelium contained in seed potatoes, is *at first* slow, and for a time proceeds, as has been remarked, without perceptibly injuring the vigor or luxuriance of the stems and foliage of the potato plant. This statement is not a mere inference from what is known as to the potato disease, but is proved by actual experiment. De Bary infected healthy potato plants having vigorous foliage, with fungus spores, in a room where the uniform condition of the atmosphere was certainly far more favorable to fungus development than the free air usually is, and he found that where hundreds of germs had penetrated the potato stems, it required 29 days before the fungus had spread through 8 inches of stem in one case, and through 4 inches in another. In these instances fructification did not take place, and the potato plants grew well, branching and leafing out luxuriantly.

If the fungus is sown upon healthy potato leaves, they often remain to all appearance healthy for a long time, even when microscopic investigation demonstrates that the fungus has penetrated the tissues.

These facts explain why the disease does not at once ravage a field into which it has been introduced by the planting, but on the contrary remains comparatively dormant until the potato has attained its full development, and the time of the year arrives when the external conditions are most suitable for a rapid and devastating growth of the fungus.

It is easy to imitate artificially what thus happens in nature, and at any season to change the slow process of infection to the rapid one of destruction. De Bary made the following green-house experiment: In February three vigorous potato stocks grown in pots were placed in the immediate vicinity of some artificially infected shoots, on which *Peronospora* existed in a state of fructification. The plants were now frequently watered, the foliage being copiously besprinkled. In a short time the fungus established itself on the foliage of previously healthy plants. They assumed precisely the appearance of field plants attacked by the disease in August. Leaf after leaf was affected, and in a few weeks the plants above ground were entirely destroyed, while nearly 100 shoots of the same kind of potato planted at the same time and placed under similar circumstances, save that they were shielded from contact with the fungus, kept perfectly healthy, and remained so for months afterward.

It is at present rare that perfectly sound potatoes are employed as seed. Actually rotten or badly infected tubers are of course not used, but according to De Bary it may easily happen that apparently sound potatoes actually contain the fungus. The fact is well known that tubers which have been slightly diseased, never so to speak, recover from the injury without decay, the diseased parts being separated from, though adhering to the sound, by a layer of cuticular matter. The small scabs or brownish spots seen on the surface of the healthy tubers, are not unfrequently the lurking places of the dormant fungus, which only needs the moisture of the soil to develop abundantly.

De Bary gives the following summing up of the cause and course of the potato disease, viz: A parasitic fungus, *Peronospora infestans*, exists only by feeding on the potato plant. Its mycelium penetrates the tubers in order to hibernate in them. Kept cool and dry, it vegetates but slowly, or makes no growth; but in the warm season, or under favorable circumstances, it increases luxuriantly. Then the mycelium extends itself into the stems of the potato plant, in order, earlier or later, to develop its spore-sacks, which, transferred to neighboring parts of the plants, yield spores that speedily penetrate the healthy tissue, and produce the *leaf blight*. The parasite spreads from one or many such sources over the field, and from one field to another—the foliage of the potato becomes discolored, and the tops die down. Of the numberless spore-sacks formed anew on the foliage, a large part lodge in the pores of the soil, and there yield myriads of spores which penetrate the earth. Some of them reach the tubers, and within them develop again the mycelium, which serves to ensure the continuation of the life of the fungus as the tuber ensures that of the potato plant. When developed in large quantity it destroys the tuber, producing the rot. In smaller amount it causes slight, often imperceptible patches of disease, through which it comes another year into the field, and renews its life, and perhaps its ravages.

Having endeavored to convey the well and repeatedly observed facts upon which is based the conclusion that the fungus, designated by botanists as *Peronospora infestans*, is the immediate and only cause of the potato disease, it remains, in the next place, to point out the harmony of this conclusion with the facts familiar to every one who cultivates potatoes, and finally, to indicate the means of checking or suppressing the ravages of the disease, as far as this is, at present, practicable.

It is universally observed that the leaf blight and the rot attack the potato most destructively in localities where the atmosphere and the soil are most liable to be impregnated or saturated with moisture. Hence we find that low lands, lying along a stream and sheltered by forest or hill, are visited by the disease when more elevated and airy positions escape. Potatoes on a hill are often unaffected, while those of the same kind in a valley a few hundred rods distant, are totally destroyed. In dry seasons, especially in those which are dry in August and September, the disease is less prevalent than in wet years. When sultry, showery weather succeeds warm and dry days, or when by a storm the air is rapidly cooled, so that heavy dews or fogs supervene, and evaporation is checked, it often happens that a field, healthy to the ordinary observer at night, is black and ruined in the morning.

This influence of moisture may be exhibited in the following manner, at any time when potato tops are at hand, on which, though their appearance is fresh and healthy, by close inspection may be found minute patches of the fungus. Two portions of such infected foliage are taken, and the stems of each placed in the neck of a glass or bottle containing water. One portion is exposed freely to the air, the other is covered with a bell-glass. Other things being equal, it will be seen in these few hours that while the exposed foliage has not perceptibly altered in appearance, that which is under cover exhibits a large growth of the brown fungus-stains, and in a day or less is black and blasted.

De Bary found that very high temperature is of less influence in developing the fungus, than an atmosphere saturated with moisture. The *Peronospora* grew with equal rapidity at temperatures of 65° and 80°, when the air is fully charged with vapor.

The fact that the conditions which develop the potato disease are precisely those which produce the fungus, is in harmony with and a consequence of the theory we believe to be the true one.

J. G. W. of Utica, in the "Country Gentleman," of Feb. 19, attacks the fungus theory with great spirit and vigor. He exerts considerable rhetoric against those who deal with nature under "bell-glasses," makes fun of trying an *experimentum crucis* on a piece of dead and cut potato, and throughout so travesties the fungus theory, or rather the plain statements on which it is based, that they are absurd to anybody. But J. G. W. offers no *facts* to rebut this theory. He does not tell us of a single observation which disproves the statement that the fungus always *precedes* the leaf-blight and the tuber-rot, and that the leaf-blight and tuber-rot always *follow* the fungus. He does not stop to reflect that this statement is the result of oft-repeated observations made during six years by Speerschnieder, De Bary and Kuhn, all skillful physiologists. He offers no evidence that an *experimentum crucis* cannot be made elsewhere than under the open sky. Through half his article, while he ridicules effectively, he does not reason at all, and when at last he begins with logic, it were better had he kept to rhetoric.

"As if the world did not know," he says, "what evidently the German did not know, that if two rows of potatoes planted side by side—nay of two potatoes planted in the same hill, one of a delicate and the other of a hardy variety, a Blue Mercer and a Garnet Chili for example, the one shall be perfectly sound and the other perfectly rotten." This may be a stubborn fact for the fungus theorizers. But it is not more inexplicable than some others known, very likely to the aforesaid German. I have seen, of two rows of potatoes planted side by side—nay of two potatoes planted in the same hill—one perfectly sound, and the other perfectly rotten, and both of the *same variety!* It is not uncommon that a streak or well-defined patch in a field is diseased, while the remainder is what would be called by most out-of-door philosophers, perfectly healthy.

It is very common to dig from the same hill, sound and rotten tubers, and I have dug from a hill an upper stratum of rotten potatoes, and a lower one of sound ones. I can't conclude, as J. G. W. does, that "in these cases the sound potatoes stood the same chance of meeting the fungus spores in their descent as the decayed ones." If an angler by throwing his hook into the stream, catches a shiner, it does not necessarily follow that every time he throws it in he will take a fish, much less that he will depopulate the brook.

Where he takes shiners in quantity, he may fail to secure a solitary trout, although the latter fish is abundant, and when in the mood is not averse to bait.

There is no kind of fish but what will take a bait, and it is equally true that there is no kind of potato that is not more or less susceptible to disease. The Garnet Chili, and some others of Mr. Goodrich's seedlings, have exhibited a great power of resistance to the rot, but even J. G. W. does not affirm that this variety is totally exempt from disease. J. Talcott, who cultivates the Garnet Chili at Rome, but a few miles from Utica, reports that with him they have rotted for three years, last year 20 bushels out of 180, "being affected more or less, so that they are not fit to use."

In Germany, Dr. Klotzsch in the year 1850, produced a hybrid seedling by impregnating the flower of a "right vigorous" potato, with pollen from the *Solanum utile,* a species differing from the ordinary potato, *Solanum tuberosum,* in having an aromatic fruit, (seed ball.)

This so-called Bastard potato had hardy qualities, similar to those possessed by Mr. Goodrich's seedlings. In 1856 it was entirely unaffected at Berlin, when all other varieties were totally overpowered by the disease. Dr. Schacht, the eminent Botanist, says of this potato "that the foliage is firmer, and the cuticle of the stem and leaves, which in the common potato is extremely delicate is thick, and beset with wart-like prominences. The tubers have extraordinary solidity, and the cell partitions are much thicker and stronger than in the common potato."

Here we have an example of a potato capable of withstanding the rot, when other kinds were badly damaged, and the reason of its hardiness is to be found in the great resistance opposed by its firm tissues to the boring of the fungus. Dr. Klotzsch was of the opinion, when he produced this seedling, that the renewal of constitution occasioned by raising from seed, was the secret of its immunity from the rot, but this idea had to be abandoned, for in 1856, Dr. Ludersdorff informs us that he saw this potato infected with the disease. In Germany other kinds of potatoes are known, viz.: Ockel's Rio Frio, the Onion potato of Saxony, and the Green or Heiligenstadt potato, which have shown an uncommon power of resisting the rot. The last mentioned is recommended as especially adapted to wet and heavy soils; but it is unfit for table use. De Bary, however, affirms for Germany what we have yet to learn to be untrue for this country, that no kind of potato is capable of absolutely withstanding the disease. Those varieties, which from the fact of being thick-skinned or deep-rooted, are less liable to destruction, do nevertheless succumb to the rot, under circumstances that are eminently favorable to the development of the *Peronospora.*

The theory that the grape and potato disease is the result of a stagnation of juices, resulting from cold damp, or hot damp changeable weather, is as old as Hales and Parmentier. The idea that it attacks some varieties more easily than others, because these have become enfeebled by irrational culture, or by excessive tuber propagation, has had its vigorous advocates in this country and abroad. Both theories are wanting in any real support. The stagnation of juices is a mere intangible fancy. No one can define it. The circumstances which are said to produce it, often do not. If a close steaming atmosphere stagnates juices, why are hot-beds and hot-houses tolerated for an instant? If stagnation induced in enfeebled plants is the cause of the potato disease, why did not all the old-fashioned enfeebled varieties suffer at once and equally? If the Mercer and Peach Blow are enfeebled, how is it that superb crops of them are yearly obtained? The "constitutional weakness" is simply a phrase, by the use of which we conceal from ourselves and our neighbors the extremity of our ignorance. The sole evidence of this weakness is the fact that potatoes rot. But if a variety is enfeebled, the *variety* should perish, or if it is renewed by proper treatment, it should then resist the disease. It is not physiological to see a large crop of fine tubers one year, a crop of diseased ones the next, and a large crop of sound ones the third year, propagated on the same farm, from the same parent tubers, and of the same enfeebled variety.

Why should the enfeebling of hundreds of varieties of potatoes, which for generations had invariably maintained their excellence, and given satisfactory crops, have culminated in disease in the year 1843—the crops being still admirable as to quantity in that very year?

The theory that continued propagation from the tuber weakens a plant, is not sustained by any direct observations or experiments, but is arrived at in the following circuitous and illogical manner. The fact is observed that potatoes rot, grapes mildew, and other plants suffer from blight or rust. Without any adequate study of the disease itself, hypothesis No. 1 is set up that these plants suffer because they are enfeebled, and incapable of resisting atmospheric vicissitudes which do not disturb healthy plants. To account for this *imagined* debility of constitution, hypothesis No. 2 is invented, viz: that propagation by tnber, layer, cutting, bud, or something else than seed, weakens a plant. The whole theory is baseless.

I am aware that certain phenomena have long been currently accounted for in this manner. The wretched state of the Lombardy poplar in this country, is attributed, in our older botanical works, to the fact that we have but one sex of that diœcious tree with us; no seed is therefore produced and propagation being continued by cuttings, the tree is asserted to have "run out." This doctrine has been accepted without adequate criticism, and is opposed by all the experience of the fruit and flower culturist.

What variety of grape, rose, dahlia or other plant that has been continued in existence for years, or even centuries by other than seed propagation, has run out, or begun to run out from that cause? The advocates of the theory of "constitutional weakness" may be safely challenged to produce a single fact that unmistakably sustains their doctrine. The failure of the Garnet Chili to withstand the rot, has settled the matter for Mr. Talcott, and ought to for J. G. W. The latter will allow me to say that if anything that he or I have caused to be printed in the "Country Gentleman," deserves to be characterized as "altogether too visionary, fanciful and far-fetched," or as "arrogant, not to say absurd," to my mind it is that pet theory of his, the distinguishing character and peculiar excellence of which is "constitutional weakness," the Pelion of unreason piled on the Ossa of conjecture!

The doctrine we combat not only lacks the merit of truth, but it has all the virus of falsehood. It not only leads to wrong conclusions, but it leads away from correct results. Propagation by tubers, layers, offsets and buds is not only not enfeebling, but is as natural, and therefore as healthful under proper conditions, as reproduction from seed.

More than this, the vine dresser and horticulturist know these methods of propagation, skillfully combined with scientific culture, are in many cases means of attaining excellencies of character and constitution that mere seed reproduction does not readily admit of.

We must not suffer ourselves to be misled by apparent or shallow analogies. The bane of vegetable physiology has been, and to a great degree still is, the assumption that plants are in this or that respect like animals. The "circulation of the sap," its "elaboration in the leaves," the "stagnation of juices," are specimens of ancient speculation that infest our text-books in the school, and our hand books in the orchard or vinery.

They are the scape-goats of learned ignorance, the last resort of wisdom that is never at a loss to render a reason. They serve the psuedo scientific cultivator the same office which Semmes' Hole performs to the stay-at-home Arctic Explorer—are an inaccessible and bottomless pit, large enough to engulph all difficulties.

The other objections raised by J. G. W. to the fungus theory, remain to notice. The first difficulty he suggests is, that two kinds of potatoes are unequally affected We explain this as has been intimated, by the fact that the cuticle and cell tissue of the hardy kinds are thicker and denser than in the delicate varieties, as Schacht has observed in the case of Klotzsch's Bastard.

The second difficulty suggested by J. G. W. is, "that potatoes grow and are dug and are rotten in seasons so dry that the earth is never wet down so far as the potatoes in the hill. Especially does this absence of wet often exist during the interval between the appearance of the disease upon the leaf and upon the tuber." De Bary distinctly states that the spores penetrate a *moderately* wet soil. A slight rain or heavy dew, succeeded for some time by cloudy close weather, which hinders the drying of the surface, probably provides the conditions necessary for the fungus to reach the tubers. If the fungus is in the tubers, it can't well be doubted that it in some way reached them, although the precise mode or conditions of access be but imperfectly understood. The fact which I have observed, that deep-lying tubers may be perfectly sound, while shallow ones of the same kind are entirely rotten, accords with the supposition that the spores penetrate easily to some depth, but do not pass beyond a certain limit.

As to the rotting in the cellar, of potatoes which at the time of digging were *apparently* sound in tops and tubers,—this would happen if the plants were moderately infected at harvest, and then were carried into a damp cellar, especially if the tubers were thrown into large heaps or placed in deep bins. The fungus spores did undoubtedly remain concealed and inactive in the tubers, until placed in the cellar. One or two other questions remain which I do not attempt to answer, as the facts implied in the questions, might not be found to exist.

That the Potato disease is as ancient as the potato itself there can be no reasonable doubt. We have no exact observations as to the occurrence of the potato fungus, (Peronospora) in the native land of the tuber; and the climate is such as to be on the whole unfavorable to the development of the fungus, being elevated, airy and of equable temperature; nevertheless many accounts have come to us, which indicate that the rot is by no means unknown on the Cordilleran table-lands. The Jesuit Joseph Acosta observed in Peru in 1571, that the tubers of the potato often spoiled in the earth, during or after cold bad weather, from "blight or mildew." Payen, in the Proceedings of the Paris Academy, mentions that according to communications made by Mons. Goudot, a disease prevailed in the Cordilleras, which if not identical with, had the greatest resemblance to the tuber-rot of Europe and North America. Boussingault sent to the Paris Academy in 1845 a letter from Bogota, in which was stated that on the table-lands of that vicinity the potato *spoiled in moist situations every year, and in wet seasons spoiled everywhere.*

Similar statements indicate that the disease was locally known in Europe before 1845. Harting, in Holland, v. Martins in Bavaria, and other trustworthy observers, saw, and describe the Peronospora in 1845. In Alsace, a malady corresponding to the potato rot was observed in 1816; the same happened in the neighborhood of Orleans, France, in 1829. Finally, in a treatise on the potato, written by Ludwig in 1770, but 50 years after the field culture of this tuber had become extensive in Germany, and ten years before its introduction into France, occurs the description of a malady or "visible blight," which attacked the tubers, and could be seen on paring the potato, as a brown or black discoloration. It is thus probable that the potato fungus was imported with the potato into Europe and North America, and is the universally existing cause of the disease. The epidemic form which it has assumed of late years, is due to the wide-spread presence of the conditions favorable to its rapid multiplication, and in no small degree to the fact that the culture of the potato had been immensely extended for a number of years previous to the appearance of the epidemic.

The cure can only be accomplished by destroying the cause. It would appear, so universal has the disease become, that to remove the cause—to extirpate the fungus—is an impossibility, and really we are compelled to believe that such is practically the fact. At the same time a knowledge of the habits of the fungus, may enable us in most cases to avoid the rot to a good degree.

The grape fungus, *Oidium Tuckeri*, and other forms of mildew are subdued by sprinkling with sulphur. These fungi however, grow on the *surfaces* of the plants they injure. Since the potato fungus penetrates the interior tissues of the whole potato plant, it is doubtful if any effectual means of poisoning it without doing injury to the potato will ever be discovered. Mowing off the tops of the potato when they show symptoms of blight, has in many cases saved the tubers. In other cases it has failed, because a crop of the fungus spores has notwithstanding penetrated the soil to the tubers. Doubtless the removal of the tops from the field altogether, in the early stages of the blight, might be effectual in cases where simple mowing would not answer. Deep-planting is remedial if not in all cases a remedy. It operates by putting the tuber below the reach of the spores that fall on the ground from the blighted foliage. We observe that deep-lying potatoes are often sound, when those above are decayed. We should hence expect to find that such varieties of the potato as naturally issue the root-stocks and tuber-buds deep in the soil, would be less liable to rot than the shallow-rooted kinds. Deep planting cannot be expected to prove an entire cure in all cases, since no reason is manifest why the fungus should not travel down to the tubers through the root-stalks. Again, potatoes if planted too deep do not sprout readily, and consequently make a feeble growth. The buds of the potato tuber, like the germ of a seed, cannot make an iota of progress in development, without the constant co-operation of oxygen gas. If the supply of this indispensable agent is cut off they perish; if it be furnished them in insufficient quantity, they grow slowly, and the process of growth is easily checked, and converted into one of decay. The German peasant has a saying, that "potatoes must be planted so as to hear the wind blow." Potatoes sprout best when covered but two or three inches, if the covering be soil.

Dr. Kuhn, (now Professor of Agriculture in the University of Halle in Prussia, formerly director of large estates in Germany, and author of a valued work on the diseases of agricultural plants, has for many years employed the following mode of culture with success: Tbe potatoes at planting are covered lightly two or three inches and without raising the ground over them. *So soon as the tops begin to appear* above the surface, the soil is thrown over them loosely and deeply as possible, by a shovel-plow or other suitable instrument. A light wooden harrow is now made to traverse the ridges lengthwise, so as to break down clods and fill up cavities, but not to reduce the height of the ridges much. In a few days the sprouts appear again with renewed vigor, and the cultivation is then continued as usual to the end of the season. It is important that the sprouts should be covered before they get much above ground, otherwise they turn yellow and suffer. It is *stems* and not leaves that must be buried. This method is not practicable on heavy tenacious soil, but may be employed on all lands that are well adapted to potato culture. It is well known that hilling the potato increases the crop, for the reason that the tubers are produced on stalks which issue from that part of the stem which is between the surface of the ground, and the true roots. The longer the vertical subterranean stem is, then the more numerous will be the tubers formed.

The French gardener, Hardy, has proposed a method to destroy the fungus, (which he supposed, but did not prove to cause the disease,) that has been much advocated in the south of England. The potatoes are planted as usual, and as soon as the blight appears, the tops are pressed over with a roller, and kept flat. His idea was that by this treatment spores would be washed off the plant by the rain, and rendered innocuous. It is found that while potatoes thus treated are not entirely saved, they are generally less, and sometimes far less damaged than when the rolling is neglected. The obvious explanation is that the spores that are carried by rains from the tops into the ground, mostly, or in a great degree penetrate the soil *between* the rows, and thus come less into contact with the tubers.

Still more efficacious is the method of Hornsey, which consists in laying off the potato tops half right and half left along the rows, and throwing soil upon the ridge among the stems and roots. If the potatoes are well hilled up and treated in this manner, in most cases a great saving may be expected, according to the testimony of English farmers who have employed it.

Short's methods, consisting in trodding down the stems and covering them six inches deep with soil, is not only too expensive for general use, but has not proved specially efficacious, for if the covering is done early, the potatoes, though they remain sound, are small and unripe, while if done late, the stems decay rapidly under such a cover of soil, and develop so much heat and moisture, that the fungus multiplies extraordinarily, and the rot, so far from being checked is greatly aggravated.

Prof. Bollmann of St. Petersburg, proceeding from the conviction that the cause of the disease goes into the field with the seed tuber proposed to destroy that cause by heat. He directed to dry the tubers by artificial heat until they had shrunken together and lost a good share of their moisture. This method in his hands, and in the hands of others, has succeeded in some cases; in others it has failed. It deserves more careful and extensive trial. The failures that have been observed in attempting to test this method may easily be accounted for without supposing that the method itself is a failure. It appears highly probable that the spores of the fungus might be destroyed by a *dryness* that would not damage the potato bud. Artificial drying, however, would likely be conducted at too great a temperature, such as to destroy some of the potato germs. The potato should be cut into small pieces, with one eye to each, and then allowed to dry perfectly at a low or only moderately high temperature, until they are hard and brittle.*

Mr. Holland, (Sussex county, England) cultivates the potato in the following manner: The land was dunged in autumn, ploughed again on a mild day in winter, and furrowed at planting time, at distances of thirty inches, as deeply as possible, in a northeast and southwest direction. On the ridges thus thrown up, a furrow 8 inches deep is made, and the potatoes dropped at distances of six inches; they are then covered with the finest, lightest earth to be had. Twice monthly the soil is hilled up against the potatoes. When the blight manifests itself, its progress is carefully watched

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* The practice of an extensive potato grower and close observer in this State, may be noted as in some measure corroborative of these suggestions from Prof. Bollman. Hon. A. B. Dickinson informed us, in visiting his farm in Steuben county, 5 or 6 years ago, that it was his uniform system not only to cut the potato into small thin pieces with one, or at most two eyes in each, as above recommended, but to allow of their becoming quite dry by exposure to the atmosphere, and as a farther preventive of rot, by affording additional protection against moisture, to coat the cut potatoes with a thin covering of tar and plaster before planting. Eds. Co. Gent.

and as soon as it has attacked the main stem, all leaves are stripped off and the diseased stems are also removed, the plants being left either to dry away or send out shoots as the case may be.

The skillful and intelligent farmer will begin with the seed potatoes, and be sure that no diseased ones go into his field at spring time. If the stock of seed on hand is diseased, the potatoes should be cut, each one carefully examined and all diseased pieces rejected. If cut a month before wanted, all the better. The soil should be well drained, rather light, and not freshly dunged with fermentable substances. A high, airy locality is preferable. Cover the shoots several inches deep, as soon as they show themselves, and if the disease comes on violently, cut off the tops, unless the promise of succeeding dry weather is such as to make that trouble unnecessary by checking the development of the fungus. It would be well to give the plants a good deal of room, so that the stems and lower foliage may be reached by the wind, and thus kept from excess of moisture. If the blight shows itself but moderately, bend the tops away so as to leave the ridge uncovered. In hilling up avoid gathering the stems into a close bundle, but separate them, earthing *among* them as well as around them.

By these precautions based on the fungus theory, we may hope, in the larger share of instances—in all cases, indeed, save where fatality of situation or weather are against us—to raise fair crops of fairly sound potatoes.

SPEECH OF HON. JUSTIN S. MORRILL, OF VERMONT,

In the House of Representatives, June 6, 1862.

The House being in the Committee of the Whole on the state of the Union, and having under consideration the bill donating public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts—

Mr. Morrill of Vermont, said:

Mr. Chairman: I shall avail myself of the parliamentary privilege to-day, of general debate, to make a speech without the pepper or spice of party or sectional politics, and yet I hope one not without some interest to the House. I shall discuss a measure which has heretofore received a generous support on the part of Democratic members, almost the undivided support of the South American members, (formerly so-called,) and with about two exceptions, the undivided support of the members on this side of the House; I mean the land college bill, for which I hope to obtain the favor of a large proportion of the present House.

Mr. Chairman, among all the measures before Congress, since I have been a member, there have been few, save those designed to maintain the credit of these United States, which my judgment and heart have more approved, than this measure, providing for the education of the industrial classes of the young men of our country. Just in itself, benevolent in its scope, demanded by the wisest economy, it will add new securities to the perpetuity of republican institutions. Wronging nobody, it will prove a blessing to the whole people, now and for ages to come.

The bill, or one like it, has once passed Congress by very large majorities, but unfortunately, among other sins which President Buchanan now has leisure to repent of, is his veto upon a bill of this character. Under more favorable auspices it is now again brought forward. If it passes, as I cannot doubt it will pass, Mr. Slidell, were it convenient for him to be here, would hardly command a veto from the present patriotic occupant of the White House, as he was charged with having done on a former occasion. With this Congress my humble services here will terminate, and the only favor I have to ask of this House is to vote upon this measure squarely on its merits. If its character challenges approval, if the times more than ever persuade to its adoption, then give such a vote as will wake into life the instrumentalities whereby a solid, useful and practical education can be had on terms within the reach of thousands willing and expecting to work their way through the world by the sweat of the brow.

It is true that some measures which we have been considering, of more or less merit, I have thought it inopportune to press at this particular juncture of affairs; but I do not include this among them. Instead of being postponed, it is a measure that should have been initiated at least a quarter of a century ago, and if it had been, our taxable resources would now have been far greater than they are, and the absence of all military schooling, would, at the outset of the present rebellion, have been less conspicuous in the loyal States. Agriculture might long ere this have felt its influence; the statistics of the country might have been more abundant and valuable; the young men might have had more fitness for their sphere of duties, whether on the farm, in the workshop or in the battle-field.

Something of military instruction has been incorporated in the bill, in consequence of a new conviction of its necessity, forced upon the attention of the loyal States by the history of the past year. A total unpreparedness presents too many temptations even to a foe otherwise weak. The national school at West Point may suffice for the regular army in ordinary years of peace, but it is wholly inadequate when a large army is to be suddenly put into service. If we ever expect to reduce the army to its old dimensions, and again rely upon the volunteer system for defence, each State must have the means within itself to organize and officer its own forces. With such a system as that here offered—nurseries in every State—an efficient force would at all times be ready to support the cause of the nation, and secure that wholesome respect which belongs to a people whose power is always equal to its pretensions.

This bill proposes to establish at least one college in every State, upon a sure and perpetual foundation, accessible to all, but especially to the sons of toil, where all the needful science for the practical avocations of life shall be taught, where neither the higher graces of classical studies nor that military drill our country now so greatly appreciates will be entirely ignored, and where agriculture, the foundation of all present and future prosperity, may look for troops of earnest friends, studying its familiar and recondite economics, and at last elevating it to that high level where it may fearlessly invoke comparison with the most advanced standards of the world. The bill fixes the leading objects, but properly, as I think, leaves to the States considerable latitude in carrying out practical details. Some of the States already have colleges started on the principles here embodied, — as Pennsylvania, New York, Michigan, Maryland, Ohio and Iowa—but these linger with a very incomplete staff of Professors, as might be expected from the scantiness of their funds. The aid tendered here will enable these States to fully equip these institutions or to found others where it may be thought wise to give military science something of greater prominence. Some States, perhaps, may have more literary colleges than are or can be liberally sustained. Part of these may be easily transformed so as to come within the terms proposed. Every State will be the judge of its own requirements, and I have no doubt each will feel sufficient interest in the subject to make a judicious disposition of the grant.

Against all speculation or squandering this bill is most stringently guarded. The entire fund is to be held good, and wholly devoted to the object, as the States are to pay all incidental expenses, even the first cost of the buildings and their subsequent repairs. But it cannot be doubted that in every State this charge will be mainly a nominal one, as many towns will be likely to strive to secure the location of these institutions within their limits and an active competition will arise from the tender of lands and buildings, in order to obtain an end so desirable.

If these colleges should be established, it is to be hoped the donation of lands, with some little outside aid, will be sufficient at no remote period to offer instruction free of any charge for tuition, and through connection with farms which may be attached, indigent young men, by voluntary labor of a few hours each day, may, where desirable, give an equivalent, wholly, or in part for their board. Certainly the opportunity of obtaining a sound education, adapted to the wants of the individual will be offered at reduced rates, a love of useful labor will be promoted, and thus health and usefulness cannot but be advanced among those who otherwise might waste a life in uncultured ignorance or cultivated imbecility.

Not one in fifty of those young men who apply to us to be nominated as candidates for the Military or Naval Schools, can be gratified. All these young men feel conscious of their ability to do something honorable for themselves and their country, and their ambition takes the direction of these schools, mainly because they know not how elsewhere to obtain a fitting education. The numbers of this class will now be greatly augmented. The ability of parents to educate their children will be curtailed, while the desire to obtain an education, especially a military one, will have been increased. These young men, if this bill should pass, will find a field open to them large enough to satisfy all reasonable ambition.

There is no appeal that comes so resistlessly to our sympathy—and there are few men here, I dare say, who have not felt it—as that of a bright-eyed boy, without means, but strong in virtues and noble aspirations, seeking the temporary aid that will enable him to achieve a liberal education. Let the corner-stones of these land colleges be laid, and this army of lads, who are so soon to take charge of the institutions of our country, will, with all the enthusiasm of faith and hope, "thank God and take courage!"

The question, "what shall we do with the public lands?" has long been one of the most interesting political problems to be solved. In ordinary times our taxation has been so light that the revenue obtained from this source might have been reimbursed from other sources without much complaint; but now we have not only to curtail expenses, but to enlarge the circle of every revenue bill. From the seeming vastness of our public lands, magnified by all the wastes, mountains, waters and deserts, it has been thought impossible to overestimate their extent or value; and on the theory that they were inexhaustible, they have always, when sold, been held at an inconsiderable price — scarcely more than the fees for transfer and record of title in older countries — and, when given away, the mile-squares have been bestowed with a lavishness only equaled in the days of feudalism. The legislator, from his dizzy height, has looked over all the broad area, and like one of old has been ready to say to all with unappropriated votes, "all this will I give thee, if thou wilt fall down and worship me!" Grants for railroads and military bounties have been made with such loose abundance as to destroy the gifts and more than satisfy all demands, whether of the hardy pioneer, or the velvet-footed speculator. Our bounty has proved a deluge rather than a refreshing shower. All markets have been glutted, until these Government largesses, sweated and consumed by their own reeking fatness, have shrunk to less than half of their original value, and in part now remain, having conferred benefits only by halves, to clog the operations of Government in its hour of largest beneficence and largest need.

The Government price for land, except to actual settlers for five years, is now $1.25 per acre, and if it were five dollars per acre, it would be no dearer, than $2.50 was twenty years ago to the settlers of Indiana and Illinois and cheaper than any other land now to be had under the most enlightened and liberal Government of the world. Even in Australasia, where they sell land at auction for all it will bring, the upset price in the poorest colonies has been not less than one pound sterling, or about five dollars, and then what more they can get, while the best lands, and those within three miles of any town, are held much higher. To the 500,000 farmers in France, who own upon an average, but seven acres each, $1.25 must appear a bagatelle, and to the Irish farmers, who in some rare localities, pay £10 to £30 (or $50 to $150) rent per acre, it must look like a *bull* on the part of Brother Jonathan.

Those who have given this subject that attention it deserves, know settlement has already approached the limits of most of the profitable farming lands within our domain. Some of the lands are fertile, but destitute of wood or of water. The red man still wanders on the verge, and where he has disappeared the prairie wolf remains at least to frighten sheep. With some good there is much poor land in our Western Territories. An acre may be worth the Government price, provided there is a dozen prairie chickens upon it! In the new States there is much land yet to be had of great value at very low prices, but comparatively little of this remains in the hands of the Government. In our Territories the fertile lands are not found to be universal, as they were nearly so in Illinois and Iowa, but they lie in parcels—here a little and there a little—embroidering the margins of streams, and standing forth in greater beauty from the rule of contrast — oases in the deserts.

There were, September 30, 1861, of surveyed public lands, 134,-218,330 acres, the unsurveyed being many times greater. Of these lands, it is proposed to donate to the States for these colleges, if all should accept the conditions, about 9,000,000 acres, or 6,000,-000, if only the loyal States should be able to avail themselves of the grant. It is an inconsiderable grant in proportion to our means and not a large one in proportion to the object in view. We have now abandoned the public lands as capital, with the design of deriving a large revenue from those who may settle upon them and make them fruitful. And here these land colleges come into aid in the plan of improving, not only the new lands, but also the old, and thereby extending the basis of taxation and revenue. A tract of land to a man who knows how to make it a real homestead, with all its train of joys, is a blessing; but to all others it is at best a bauble, and often a curse. To give all men an opportunity by their own labor to obtain a substantial support, is a problem most governments endeavor to solve. We have a higher and possibly more difficult task, which is to combine the largest freedom with the largest rewards of labor, free government and personal independence — and this can only be done by the largest knowledge. Success in working out this problem secures the immortality of our Republic. The man who earns but fifty cents a day cannot be taxed one fourth part of it, or twelve and a half cents, without starving his children; but let him earn two dollars a day, and he will pay double the amount, or twenty-five cents, and not only survive it, but ask the tax gatherer to stop and dine!

The policy of the Government towards the Territories and the New States, has been liberal as it deserves to be; but I think few who have not read the report of the Secretary of the Interior, are aware of the extent of that liberality. Within the last four years there have been granted to States and Territories, and reserved from sale, 49,754,606 acres. Each new State now has university lands, salt-spring lands, public building lands, and 500,000 acres each, under the act of 1841. One eighteenth part of all the lands are also at once given to the new States for schools. We have given them, up to 1861, 9,998,497 acres for railroads. Then we have surrendered all the swamp lands, amounting, within the past four years to 3,910,310 acres; and the entire claims of the several States under this head, amount to 57,895,577 acres. Added to all this we give the land States five per cent. on all sales of lands within their borders, after they are admitted as States. This is not treating these States as step-children. The four States of California, Minnesota, Oregon and Kansas, are entitled to 15,632,635 acres for school purposes alone. Beyond all we have passed the homestead law.

All the bounty land warrants and scrip issued under different acts of Congress, embrace an aggregate of 71,717,172 acres. Of this amount, all the warrants have been located except 7,454,720 acres. If the present bill should pass, it would only about double the quantity now afloat, and scarcely exceed the amount allotted to some single States. The total amount of unsold and unappropriated lands, is 1,046,290,093 acres; and, after deducting the proposed donation to these colleges, we could quadruple the amount, and still retain over 1,000,000,000 acres to be disposed of under the homestead act. Not so much as one per cent. will be abstracted.

This heritage may be so heedlessly overrun as to be soon wasted leaving behind nothing but the estate of a prodigal, or it may be so managed as to hold all comers and give them unsurpassed prosperity for centuries.

As soon as lands pass from the hands of the Government, they become subject to local taxation, and that is clearly to be desired by land States and Territories. The scrip issued will go into the hands of *bona fide* settlers, because such will be the only purchasers to be found, unless at a depreciation of price, and these will be obtained by the several States disposing of their scrip on a credit, and retaining a lien on the land. Such an arrangement will not certainly be to the disadvantage of the land States.

Saying nothing of what might be due from the new States to the old on the score of reciprocal generosity, by the present bill the land States will obtain their just proportion according to population, and it is not too much to say at the same time, that more young men will be beneficiaries of these institutions in other States who will become residents *of*, than will be educated *by* the land States themselves. These States, therefore, should be more deeply interested in the measure than all others, and I invoke their Representatives to its just appreciation.

In a speech I had the honor to make in this House (April 20, 1858,) prior to the passage of a bill of which this is mainly a copy, I attempted to show, by the facts of the census of 1850, compared with those of 1840, including other State returns, that there was a constant and widely pervading diminution of crops per acre, under our go-ahead system of farming, and that the main relief sought was such as that practiced by flocks of wild pigeons, which no sooner strip and waste one field, than they take wings and fly further on.

If this deduction has any foundation, without some speedy and efficient remedy — reaching to every State; for there are none without more or less of lean faced districts, poor farms, and poorer farmers—this agricultural decline will, at no remote time in the age of the nation, produce calamitous results. The census of 1860 is not yet published, so that a full comparison of another decennial period is impracticable, and, if the latest census tables were now at hand, the statistical information is too limited to afford more than a meagre account of what it wonld be useful, if not creditable for us as a people to know and to spread out on the record. By the courtesy of the superintendent, I have gleaned some facts, which still indicate, I regret to say, the retrograde march of agriculture, and showing that the positions heretofore assumed have only too much support in the census of 1860. The facts are by no means agreeable—not calculated to puff us up with pride—but they should be resolutely examined, to find, if possible, adequate measures of reparation predicated upon the wants of all the States.

By the returns it appears that the New England States have increased their number of horses, but to about the same extent have diminished the number of oxen, and it would be hard to say whether the gain or loss is the most profitless. All of these States, except Rhode Island have increased the product of butter, and all fall off in the quantity of cheese, as well as the number of sheep, and swine, and (except Maine and Vermont) in the quantity of potatoes. Of wheat, the whole quantity produced is pitiably small, being only 1,077,285 bushels, and of that 431,127 bushels is produced in Vermont. New York, in 1850, produced 13,121,488 bushels of wheat, and only 8,681,100 bushels in 1860, showing a decrease of 4,440,348 bushels. The number of sheep in New York—

In 1840 was	5,118,777
In 1850 was	3,453,241
In 1860 was	2,617,855

This State has nearly two million acres, or one-seventh part more land under cultivation than there was ten years ago, and yet the hay crop was less by 164,011 tons. The following table illustrates the position of New York:

	1850.	1860.
Horses, ...	447,014	303,725
Milch cows, ...	931,324	1,123,634
Oxen, ...	178,909	121,702
Other cattle, ...	767,406	727,837
Wool, (pounds) . . .	10,071,301	9,454,473
Wheat, (bushels) . . .	13,121,448	8,681,100
Sheep, ...	3,453,241	2,617,855
Hay, (tons)	3,728,797	3,564,786
Swine, ...	1,018,252	910,178

This is anything but complimentary to our system of agriculture and yet few of the old States are doing as well as New York.

In seventeen of the States—nearly all the old—there has been a loss in the number of sheep, and the number in 1860 is 22,679,386, against 21,723,220 in 1850, or a gain only of 956,166 in ten years! But for the new States the loss would nave been large, and the gain in the State of California (1,059,134) is more than equal to that of the whole Union.

Pennsylvania, with 46,000 square miles of territory, and 2,906,-115 people, should raise as many sheep as England, with about 51,000 square miles of territory, and 17,000,000 people, and yet England has 30,000,000 sheep, and Pennsylvania but 1,631,540, which gives to England nearly two sheep for every inhabitant, and 590 for every square mile, while Pennsylvania has little more than one to every two inhabitants, and only 35 to the square mile. With our unlimited cheap lands, we should export millions of wool, but England, in fact, has the past year, supplied us with millions both of the raw and manufactured.

Flax and hemp, as crops, have nearly been blotted out of the Union, though considerable flax seed is still raised to be crushed for the oil, while the fibre, the most valuable part, is thrown away. Home manufactures, in 1850, amounted to $27,486,219, but in 1860 they declined to $24,326,744; so that women, in this branch of industry, so intimately related to agriculture, notwithstanding the 4,000,000 more of women are really toiling and spinning less than ten years ago, and but little more than they appear to have done, according to the statistical information recorded, in the days of King Solomon.

The loss in the "hog crop," in many of the States is considerable, and not compensated even by whisky. Six States (Maine, Massachusetts, New Hampshire, South Carolina, Tennessee and Vermont) produce less corn than they did ten years ago. The old States exhibit little increase of corn — scarcely equalling the marvellous growth of some single new States.

I have been furnished with the Ohio annual agricultural reports, containing statistical returns of that State—so creditable in matter and form that they deserve to be the model for her sister States—and these corroborate the positions assumed, that is to say, the fact of the increasing unproductiveness of our long cultivated lands. Ohio is a fair State to put on to the witness stand. She is wise, brave and rich enough to court the test, to declare the whole truth, in order to find a cure for any defects in time. This annual self inspection, not less useful to States than to persons, discloses the real deficiencies, and all that is then needed is proper instruction as to the remedy. Ohio is the oldest of the great Western States—large, populous, and neither old and worn out, nor young and undeveloped—the golden link between the old States and the new. Her fate may be anticipated by some, and will be followed, perhaps, with unequal steps, by all the rest. It will not soil a phrase of politicians to say, "as goes Ohio, so goes the Union."

By the reports referred to, it appears that 87,821 acres *more* land devoted to the culture in 1858 than in 1850, produced 1,454,412 bushels less wheat. (*Vide* Report 1854, p. 542.) The average product is also stated to be 11.35 per acre in 1858, against 18.78 in 1850, or a falling of nearly 7.50 bushels per acre. That this is not confined to one season may be seen by taking the whole eight years after 1850 together, and the falling off of four bushels to the acre for the entire crops. This proves the steady and unmitigated decline as to the whole State, whatever particular localities may exhibit, in the capacity of the soil, at the yearly rate of nearly one bushel per acre. The substances necessary to the production of wheat are in the process of being annually exhausted, and they are not returned, though not lost to the world where they go, for we have long fattened British Durhams, according to the magnitude of our exports, and, I regret to say, British hate, by any diminution of our imports. It is no answer to say that the profits of the farmer have not diminished, because prices have advanced in even greater ratio than the diminution of the crop. The fact will still remain that the land grows less and less capable of supporting its population. Other fields may open, but this is closing. Starvation, though distant, is still visible in the skeleton at the end of the road. Land that will not produce corn or wheat, may be devoted to some other crop, but the product is likely to be less valuable. It may sustain cattle, but not men. Grazing, properly conducted, may renovate the soil, but that husbandry, while it requires fewer numbers in its conduct, also supports fewer numbers. Its profits may be gratifying to the few, but they are banishment to the many. In China, few animals are raised for slaughter, because all the land is needed to supply food for man. In Ireland their live stock has recently increased, but Irishmen have sadly dwindled. Drive out men and you give room for brutes, but the change is not pleasant to contemplate.

It must be remembered that even the old States have a vast amount more of lands improved now, and a greater population than they had ten years ago, and from these causes alone should have made a large increase of crops. But it would appear that these new lands and larger forces are becoming necessary to counterbalance the deterioration of the older fields. It is a striking fact that the increased production is derived from new lands either in the new States or lands freshly cultivated in the old States. The long cultivated lands appear to be declining at the very time when they should be advancing to a higher and more remunerative fertility. Our grain-growing region is rapidly retreating westwardly. The States that now furnish corn to any extent beyond their own consumption are few in number, and destined soon to be less.

That there is a gratifying advance of agricultural wealth within the past ten years in many respects is true, but with our magnificent opportunity and with an eye on the future, it certainly is not wholly satisfactory. We are in the rear of Europe, and that will never be satisfactory. The English have what they call exhausting, restoring and cleaning crops. But we seem to have got so far only as to adopt the exhausting crops. *There* capital finds the most solid security invested in land and its improvements. *Here* such enterprises spoil a man's credit on the *exchange*. The true system of farming would seem to be to make the land more fertile than it is in its natural state, and every succeeding crop better than the last. By our mode the earliest crops are seldom subsequently equalled, and the last are apt to be the worst.

The proportion of population of the United States engaged in agriculture in 1840 was 77.4 per cent., but in 1850 it had fallen to 44.69 per cent. In 1860 the percentage is doubtless still less, as we find the increase of population much the largest in towns and cities, and in some rural districts the population has positively diminished. Taking the cities and towns with over five thousand inhabitants, the increase has been 60.43 per cent., and all the rest of the country only 31.96 per cent., or the former nearly double that of the latter. If all the villages towns and cities should be included, the fact would be shown in a much stronger light. This tendency to desert the rural districts, and to shun manual labor, can only be checked by making the country more attractive and more renumerative. The architectural monuments of opulence have risen in the towns and cities at the expense of the more solid and pervading evidences of a nation's prosperity, which are to be mainly found in the unostentatious improvements of the buildings and cultivated fields of the rural population.

I will not attempt to enumerate what has been done and is now in progress by European nations to promote agricultural education. It would occupy too much space. It is enough to know that they all seem eager to place their people ahead in the great race for the mastery. Our nation has been the first to test the value of iron clad ships, but we lag immeasurably behind in improving the resources necessary to support such ships. The efforts of our foreign rivals are on the most liberal and persistent scale, and have thus far been in the main successful, and this is proven by their continued annual appropriations for this object. Among these governments, that of Louis Napoleon, as usual, occupies a prominent position. Many crops in France, within a few years have been doubled; some have been quintupled; live stock has been doubled in number and value; and, while the profits of farmers and the wages of laborers have also been doubled, taxes on lands have been actually diminished. The Second Empire may not claim credit for the whole of these improvements, but the services of the present Emperor have been so great, according to a late writer, "that one of the charges brought against him by his uncompromising opponents is, that these benefits have caused the nation to forget even that loss of freedom by which they have been purchased."

Coveting, as we do, American freedom, let us show that it is not held with the smallest diminution of other blessings, material or educational, so dearly purchased under other forms of government.

Ireland, with a soil of much more natural fertility, and a climate of far greater salubrity than England or Scotland, has been oftener threatened with the perils of famine than any other civilized country of the world. All this is traceable to bad farming, through a system possibly forced upon the people by political and social connection with England. They have raised grain crops in abundance and some cattle; but too poor to consume them at home, these have been sent to England, while potatoes remained the chief fare for gaunt Irish laborers. Even the bones of the few cattle, slaughtered at home, carefully gathered have been sent to England, where science and capital had made the discovery of their agricultural value.

After the failure of the potato crop in 1847, in the brief period of about eight years, cholera and emigration reduced the population of Ireland from eight millions to six millions, or fully one-fourth, and those who remained were either too feeble to arrest the downward tendency of their soil to sterility, or they were preparing to emigrate, and therefore scourged the reluctant soil to bring forth one harvest more, and then farewell! England could have borne the exodus of the Irish, but the vanishing rent was less tolerable. The Fishmongers' Society and others owned estates there, and these must be rescued. England deserves praise for the hearty manner with which she undertook the task of improving Irish farming and Irish farmers; and it is to be noted that no capital was used more effectively, than that which has been and is being expended for the establishment and support of agricultural schools and colleges. Already the face of the country presents a nobler aspect; the number of cattle raised has been largely augmented; labor is better paid and fed; and we are now beginning to recognize Ireland as in fact the *Emerald* Isle, or the first grass country of the world.

Whether our own country is following the cast-off system of Ireland or not, is a grave question. If we export to England the virgin products of our soil, and those the most exhausting crops cultivated, the cereals, tobacco and oil-cake, it is a process which makes England a garden at the expense of American farms; and we may well forebode the day when it will be no longer possible to furnish cheap food to our multiplying and dependent millions, and certainly not possible to respond to the foreign demand of either commerce or famine. If it be true that the man who sells hay will soon raise no hay to sell, because there is no return of manure, the same result is equally apparent from the export of other crops upon the consumption of which on the farm, the reproductive energies of the soil depend for supplies.

Should no effort be made to arrest the deterioration and spoliation of the soil in America, while all Europe is wisely striving to teach her agriculturists the best means of hoarding up capital in the lands on that side of the Atlantic, it is easy to see that we are doomed to be dwarfed in national importance, and not many years can pass away before our ships will be laden with grain, not on their outward but homeward voyage. Then, with cheap bread no longer peculiar to America, our free institutions may be thought too dear by those of whom even empires are not worthy, the men with hearts, hands and brains, vainly looking to our shores for life, liberty, and the pursuit of happiness.

There is and can be no mode by which the resources of a country can be so fully developed, as by educating the vast numbers who are to devote their lives to agricultural employments, as tillers or owners of the soil. By this means each man is trained to bring into action his whole mental and physical force. The immense loss of power through ignorance is saved. The factory girls in America receive two or three times the pay that the same class obtain in other lands ; but this is not all the generous gift of the employers, for they secure in the better educated American girl, a superior and more valuable labor. Intelligent labor is found to be hardly too dear at any price. This is eminently true in agriculture. A dull, uncultured man, though physically a giant does little work for which brute power might not often be easily substituted. He may move mountains, but the inevitable mouse only appears. The skilled and thoroughly trained farmer is sure to harvest larger crops, and with less labor than his unskilled and untrained neighbor. Science, working unobtrusively, produces larger annual returns and constantly increases fixed capital, while ignorant routine produces exactly the reverse.

The mere dispersion of population over a wider territory improves neither the soil, nor the cultivators of the soil, but both, for the time, are made rather the worse by experiments and theories which new conditions ever impose.

There are evils in an extremely dense population, but except in cities, our country as yet has reached no such point. The rural population is nowhere crowded. The new Territories, sparsely settled, naturally desire accessions. Their unoccupied spaces furnish none of the means to support a State. If they suddenly make drafts upon the old States to fill their vacant spaces, the aggregate wealth and power of the country is weakened, for not so much is contributed to the new as has been subtracted from the old. The dispersion tends to destroy, not markets merely, but that skill a dense population, by a division of labor, always assembles. Whatever advantages were held under the old condition of things have been abandoned, while whatever advantages may result from the new order of things, are yet distant and imperceptible.

It is the destiny of many young men of the East to find homes in the West. They can only be retained on the Atlantic slope long enough to receive their education, and that will not repress their enterprise for travel. Foreign emigration and eastern combined, will bring gray hairs into the western prairies full soon in the life of a nation. "In every nook of the world where any good is to be got," it is said, "there is to be found a Scot, a rat, and a Newcastle grindstone," and perhaps it might be added, a *Yankee and a jacknife.* Our young men will go, we expect them to go, but let them go laden with the spoils of the school house and college, a capital worth more than gold, and then they will prove of priceless value to our common country, wherever ultimately located, proudly and forever wearing the name of an American citizen.

It is of the highest moment that at this time we make no blunder in the guidance of the industry of the country, when all its resources must be taxed more severely than ever in all our previous history. While we are compelled to place most unusual burdens upon the people, none of whom can escape, let us pass one act they will all hail with delight. If they are made to carry weight let them have some chance to increase their strength. The people are called upon unceasingly to do something for their Government and they do not fail to respond because it is their Government, but it would not chill their patriotism if the Government should for once do something for them.

Undoubtedly agricultural chairs or professorships should be founded in all our colleges and universities. Every man owns or expects to own land at some period of his life, and it could certainly do him no harm to be taught how to manage landed property. If made a part of the regular course of studies, an opportunity would be given to acquire information that might in the changing circumstances of the world prove of the highest value in practical life. But these professorships, as important as they are admitted to be, would not satisfy the whole demand. The present institutions are hardly more than equal to the task of supplying the learned professions so called, with their annual reinforcements, while others are wanted where the idea of labor shall be uppermost and where the *esprit du corps* of those instructed will seek highest honor in no other direction.

It is true, nearly all the more modern sciences, are, more or less related to agriculture or the mechanic arts, and they are liberally recognized by professorships in most of our institutions of learning but, as generally taught, there is little special application to agriculture or the arts. It is too far removed from any expectation of practical use, and, as with some merely ornamental branches, only so much of technical knowledge is given as might be unpardonable for a gentleman to be without.

The prejudice against educated farmers arises from the fact that, while those usually styled such may be truly educated in some sense, they have no real agricultural education, and are no more fitted for their duties in that sphere than the aeronaut is fitted for a railroad engineer. When we have a race of educated farmers, men who have parted with their conceit for absolute knowledge, practically illustrating their education by their works, they will not turn out sailors on horseback, as it may be admitted, some of the so called book farmers have done. Merely practical men have looked at science as though it were a goddess in the clouds, to be worshipped only by fanatics and afar off, when it is really a handmaid, beautiful and busy everywhere at saving labor and capital.

Men who are not farmers often by choice or chance have estates come into their charge, and then find themselves entirely unequipped, having had little theory and no practice, to manage them successfully. Such estates must be disposed of for the most any neighbor chooses to give, or the owner will have an outlay and not an income while it remains in such hands. This mortification could not happen if only general ideas of farming economy were more widely taught. That man only is independent who feels able to support himself and family by the plow when other avocations are closed; and he may feel sure his taste has become vitiated if he indulges the idea that other avocations are more fruitful of health, honors or happiness than that of the genuine American farmer. The business of agriculture is sometimes thought to be uninviting by those in other walks of life, and they shun any investigations of the great truths which underlie and surround it, as much as they would shun instruction in the craft of a tinker, lest they should some day be called upon to mend their neighbor's pot.

The experience of other nations in war, in arts and in the sciences, is unhesitatingly resorted to, and all progress therein is appropriated as common property of the world; but in legislation, philosophy and education, reform based upon the most valid tests of foreign examples is treated with the coldest hospitality. It is not a sufficient reason because agricultural and military education has been extensively ingrafted upon the system of other nations that the same policy should be transplanted here; but confuting the stupid idea that success is impossible, it is a reason why we should earnestly investigate the subject, and, if our necessities show that we stand in as much or more need than those who have successfully led the way, it is a strong argument why the policy should be adopted.

Popular common school education has been slowly combatting the prejudices of the world for generations. Starting from the Sunday afternoon catechism in Protestant Europe and America, it required two centuries to arrive at its present condition. At this moment the cause is receding in Prussia, but gaining in England and elsewhere. We mock the timid pace with which other nations adopt our plan of universal education, but forget what laggards we are in the adjoining field where they appear so much in the advance. Whoever is at the lowest round of the ladder manifests the least inclination to rise, and those highest up have the most ambition for still greater achievements. Among the motives which should stimulate us is the desire to improve man himself, and added to this we have all that moves our great European competitors, namely, the increase of wealth and power. Manufactures take no steps until agriculture produces a surplus beyond what is required for its own consumption, and from this surplus arises raw material and cheap bread, which make the arts and manufactures flourish. From these results commerce. Trade derives all its support from the basis furnished by agriculture and manufactures. Then follows the necessity for military and naval protection. In a free government we have proved, notwithstanding some, "in time of temptation fall away," that patriotism is spontaneous; but doubtless many valuable lives would have been saved in the progress of this plague-spotted rebellion, had we not so long assumed that military discipline was also spontaneous. If ever again our legions are summoned to the field, let us show we are not wholly unprepared. These colleges, founded in every State, will elevate the character of farmers and mechanics, increase the prosperity of agriculture, manufactures and commerce, and may to some extent guard against the sheer ignorance of all military art, which shrouded the country, and especially the North, at the time when the tocsin of war sounded at Fort Sumter. This latter view becomes more important from the suggestive discovery that in any grave controversy the old Governments of the world are not our friends. Our obituary is the only service for which they manifest any alacrity. They would see us humbled. Clearly our growth is an eyesore to aristocracy. In peace they would buy and sell with us, but in war they would sell us and buy our enemies Commercially they find us when docile, at least useful; but politically they would shun as a pestilence that walketh at noonday. We can only be secure at home and abroad by being ready at all times to "ask nothing but what is clearly right, and submit to nothing wrong," and with Jacksonian nerve accept any responsibility of our position. The true way to nurse patriotism, after having institutions that are really worth a struggle, is to inspire our people with confidence, by giving them proper training, that they are equal to their mission, and that failure is impossible.

Some may argue that the institutions proposed will turn out unsuccessfully. It may be that they will, but the object more than compensates the risk. If put into incompetent and unworthy hands, they will of course fail, and so would free government itself. But this would impute an imbecility upon the Legislatures of the several States. they have not deserved. Let us not believe they will prove inert, helpless or wanting in capacity to develop so palpable a boon. I have faith in the sagacity of the people to profit by the experience of the world, and that they will mold these institutions in a form, and place them in charge of such men, as will secure permanent usefulness and enduring honor to the whole country.

NOTES OF A CHEMICO-AGRICULTURAL TOUR,

Made principally through portions of France, Germany and Belgium, in the summer of 1861. By EDMUND WM. DAVY, Professor of Agriculture and Agricultural Chemistry to the Royal Dublin Society.

In conformity with the recommendation of the Department of Science and Art, I went during the summer of the past year on a chemico-agricultural tour to the Continent, with a view of visiting some of the principal schools of agriculture, and learning the nature of the instruction given in those institutions; I also hoped to obtain some information as to the manner in which different crops are cultivated abroad; and finally, by inspecting, and if possible studying for a short time in some of the most celebrated continental labratories, gain some information which would be useful in the instruction of my labratory classes in chemico-agricultural analyses.

Proceeding by London, I called on Drs. Graham and Hofmann, from whom I gained some useful information relative to my intended tour, and by the recommendation and introduction of the former gentleman, before leaving for the Continent, I paid a visit to Rothamstead, where, as is well known, Mr. Lawes and Dr. Gilbert carry on very extensive researches connected with the chemistry of practical agriculture.

I was courteously received by Dr. Gilbert, who most kindly showed me Mr. Lawes' chemical labratory, and took me over his experimental farm. I was greatly pleased with the neatness of the well-constructed labratory, and with the completeness of all the arrangements for carrying on the important investigations in connexion with agriculture which Mr. Lawes and Dr. Gilbert have been, and still are, engaged in. On the experimental farm, where experiments have been conducted with the greatest care for a series of years, with various natural and artificial manures, on a considerable scale, the appearance of the different crops, even so early as the latter end of May, when I saw them, was sufficient to afford the most convincing proof of the correctness of the views entertained by those gentlemen relative to the necessity, in the practical application of manures, of having nitrogenous matter (capable of furnishing ammonia, nitric acid, or some other assimilable form of nitrogen), in addition to the mineral substances required by plants, in order that the vegetables we cultivate may grow with the greatest luxuriance, and yield the most remunerative crops. Dr. Gilbert also showed me, in the park at Rothamstead, some very interesting effects of different manures, when applied for several years to permanent meadow land, which is a subject of much practical importance. Some of those effects which I saw were the following; that where a mixture of purely mineral manures had been applied, the principal effect was to develop and increase the growth of the leguminous plants contained in the meadow land; but it had scarcely any effect in promoting the growth of the graminaceous plants, or natural grasses. Where, on the other hand, purely nitrogenous manures—as, for example, ammoniacal salts, or nitrates—had been applied, their effect was to increase the growth of the natural grasses, and rather to discourage the development of leguminous plants. But where a mixture of both mineral and nitrogenous manures was used, the growth and produce of the natural grasses were greater than when each kind of manure had been employed separately; while, at the same time, the mineral manures, when in combination with the nitrogenous, did not, as when used alone, produce the same effect in developing the leguminons herbage.

These effects, which Mr. Lawes and Dr. Gilbert have already pointed out in some of their many important contributions to scientific agriculture, were most strikingly evident by a mere inspection of the different experimental plots. I was also shown at Rothamstead different ingenious arrangements the same gentlemen had adopted in carrying on some very interesting experiments they were engaged in, relative to the feeding and nutrition of animals.

I took an opportunity, before leaving London, to visit the laboratory of the Royal College of Chemistry, as well as that of Mr. Way, where I saw several new forms of apparatus, affording increased facilities in chemical research. I also went to the museum at South Kensington, and was much pleased with its very interesting "Food Collection," which exhibits the proximate and ultimate constituents of the most important articles of our food in a very striking and instructive manner; and I trust that ere long the Royal Dublin Society may have a similar collection in their agricultural museum, and with this view I have already commenced making such a collection. Proceeding by Folkestone and Boulogne I went by the latter direct by rail to Paris. This line of railway passes through a rather flat part of the country, which, though it here and there offers much that is picturesque, still presents along the line no very striking or grand scenery. The agriculture and agricultural productions of this part of France appear on the whole, to bear a close resemblance to that of the south of England, save that there is not so much land under pasture, and beet-root is there very extensively grown for the manufacture of sugar.

Arriving in Paris, I called on Baron Dumas, MM. Pelouze, Pelegot, and other distinguished scientific gentlemen to whom I had letters of introduction, and from whom I hoped to gain some information relative to the object of my tour. Baron Dumas, whom I was most anxious to meet, as he was one of the ministers of the agriculture of France, was, unfortunately, absent from Paris at the time of my visit; but from those gentlemen with whom I had an interview I obtained some information as to the objects of interest in Paris connected with my department of science, and during my very short stay there I visited several of the principal scientific institutions and chemical laboratories of that city. At the Jardin des Plantes, amongst objects of interest in that great national collection of Natural History in its various departments, I was much struck with the mode in which the plants are arranged in the botanic garden; for there the visitor may at once know the nature of the various plants growing there by the colors of the labels attached to each; thus *red* denotes medicinal, *green* alimentary, *blue* those used in the arts, *yellow* ornamental, and *black* poisonous; and the various plants, according to the uses to which they are applied, have one or more of those colored labels, bearing the generic, specific, and common designation attached to each, which is, I conceive, a very useful and instructive mode of arrangement.

From Paris I proceeded by the Eastern railway to Meaux, a small and ancient town situated on the river Marne, about 28 miles to the east of that city, where I stopped a day, and had an opportunity of seeing how they cultivate their different crops in that part of France. Great attention here appears to be paid to irrigation, and I was very much struck with the number of wells which are to be seen in some of the fields a short distance from the town. These wells, which are open at the top, are sunk at about a hundred yards apart; and over each three poles are placed, forming a triangle, to which is nailed a cross-piece of wood bearing a pulley, over which passes a rope having a bucket attached to it, and by this simple contrivance an abundant and convenient supply of water is obtained for the irrigation of the plants growing in the immediate vicinity of each well. Meaux is celebrated for a kind of cream-cheese (Fromage de Brie,) which is made there in considerable quantity; but I must say that I was much disappointed with it, and I fear that to most Englishmen's palates it would bear but a poor comparison with the "Double Gloucester." This town also supplies Paris with a considerable quantity of corn from the surrounding country, as well as with a good deal of flour from the mills on the Marne.

From Meaux I proceeded by the same line of railway eastward to Strasbourg, *en route* to Heidelberg. In following this line of railway running between Paris and Strasbourg, which is one of the longest and most important lines in France, considerable variety in the culture of the soil, and in its vegetable productions, is observable; for in addition to the ordinary agricultural crops, especially the cereals, orchards, and gardens of fruit trees and culinary vegetables of various kinds, are to be seen here and there along the line. Vines are also very extensively cultivated in the districts through which the railway passes, particularly in the department of Marne, which constitutes the central part of the ancient province of Champagne. In this department the culture of the vine for the production of its far-famed Champagne wines forms the chief object of the landholder's attention; and I understand that Epernay, a town which is passed along this route, is one of the chief marts for the wines of this district.

Leaving Epernay, the railway passes along the left bank of the river Marne, through a region of vines; and the celebrated vineyard of Ai, which gives its name to one of the best sorts of Champagne wine, is seen on the opposite bank.

In crossing France by this route, I was much struck with the curious system which prevails on most parts of the Continent, but which is especially observable in some of the departments of France through which this line of railway passes, viz., that of cultivating the land in long narrow stripes, instead of fields or square patches as with us; thus we may observe stripe after stripe of a few yards in width, extending from one end of a large portion of ground to the other, often as far as the eye can reach ; and these are occupied with different crops cultivated in the district, so that in passing through the country you see a succession of variously colored stripes which generally belong to different individuals, and have only a small furrow between each to mark the division of property. This system has arisen from the laws of the country, which, since the Revolution, have enforced the subdivision of property, and given every encouragement to the rural population becoming small freeholders. The laws likewise which relate to inheritance in France, where the children can each demand a share out of every portion of ground which belonged to their deceased parent, have encouraged still further the subdivision of land.

The evils of this system are now beginning, I understand, to be very generally felt and acknowledged, causing as it has done much confusion as to landed property, and throwing great obstacles in the way of the proper cultivation of the soil ; for, amongst other disadvantages of this system, a great number of these stripes have necessarily no roads running near them or other proper means of access to them ; so that is it only by crossing the land belonging to the next owner that, in a great many instances these different portions of ground can be got at, either to carry on the necessary operations for their tillage, or for the removal of their crops. Such a system must obviously tend greatly to interfere with the advancement of agriculture, and consequently with the welfare and prosperity of the country.

Arriving at Strasbourg in the evening, I remained there till the following day, when I proceeded by the Duke of Baden's railway to Heidelberg. This line passes through a very picturesque and fertile plain, lying between the right bank of the river Rhine, and the elevated mountain range of the Scharzwald, or Black Forest, which is so called from the dark tints of the foliage of its wooded heights.

In this portion of the Grand Duchy of Baden through which the railway passes, besides the usual corn and green crops, maize, tobacco, hemp, and flax, are grown in considerable quantity ; vines are also cultivated along the hills and higher ground ; and a good deal of oil is obtained from the nuts of the walnut trees, which are very numerous in this district.

My principal object in going to Heidelberg was to visit the laboratory of Professor Bunsen, and if possible, study for a short time under so distinguished a chemist; arriving there, I consequently called on that gentleman, who received me most kindly, and conducted me all through his extensive laboratories, and showed me several objects of novelty and interest which he possessed—amongst others his apparatus for spectrum analysis, with which I was much pleased. He regretted, however, that owing to his laboratories being at that time so completely full of working pupils, he was unable to accede to my wish of working with him. My stay, therefore, was much shorter at Heidelberg than I had intended; but previous to my departure I visited the Botanic Garden, which is situated close to the town, and though small in extent, is nicely laid out, and contains many interesting plants.

From Heidelberg I proceeded by rail to Stuttgart, as I was very desirous of seeing the celebrated Agricultural College of Hohenheim, situated near that city. Arriving at Stuttgart, which is the chief town of the kingdom of Würtemburg, I drove to Hohenheim, which is about six miles distant from Stuttgart. As the road which leads to Hohenheim ascends a considerable height just on leaving the town, a very good view can be obtained from it of the surrounding country, and of Stuttgart lying in the valley beneath, which affords a highly picturesque scene. Along the road a great number of vines may be observed cultivated with much care on terraces, which are cut out of the almost perpendicular sides of the hills; and these, when the vines are in full leaf and fruit, must produce a very pleasing effect.

The Royal Agricultural College at Hohenheim, which is in part supported by the state, is one of the largest and most celebrated of the agricultural schools in Germany. The College itself, which is well situated in the centre of a rich and very picturesque country, consists of a large suite of buildings arranged in the form of a square, a part of which formerly constituted a royal palace. There are about six hundred acres of land attached to the college, a portion of which is devoted to agricultural experiments, and to a Botanic Garden. Besides the apartments for the accommodation and instruction of the pupils of the College, and for the residence of its professors, the buildings contain a museum of Natural History, a library, chemical laboratory, &c. The College also possesses a very fine and extensive collection of agricultural models and implements; and I saw amongst them a number of very ingenious ones, which were invented by some of the poorer German peasants and were sent there for exhibition, and to have their practicability tested, as I was informed that this college was considered one of the chief authorities in Germany as to all questions relating to practical agriculture.

At the time I visited this institution there were about one hundred and fifty pupils there, who were of two classes; the first consisting of the sons of the surrounding gentry, and of foreigners, some of whom were of high rank; these pupils pay about thirty-seven pounds for their board and the instruction they receive, which, with extra expenses, amounts to about fifty pounds a year. These take no part in the practical operations of the farm, which are performed by the pupils of the second class, who are the sons of the neighboring peasants, and are destined to become land-stewards or small farmers; these latter pupils are maintained at the expense of the College, and when they are not engaged with the occupations of the farm, have the opportunity of attending the course of lectures, &c., given in the College. The course of instruction, which extends over a period of about two years, seems to be very complete. It consists of two parts, the theoretical and practical; the former being taught by lectures, combined with internal study, on the prescribed branches of general education, as well as on those departments of natural science bearing on agriculture; the latter, by taking the pupils out to witness, under their respective teachers, the various practical operations of the farm, which afford them ample opportunities for acquiring a thorough knowledge of practical agriculture. When the pupils have gone through the prescribed curriculum of study, it is optional with them to submit themselves, or not, to a final examination, which if they pass they receive a certificate stating that they have been properly educated in the science and practice of agriculture; but, as this examination is not compulsory, many do not undergo it.

On the farm, amongst other objects of interest, I was shown a very simple and excellent arrangement for washing sheep; it consisted of an oblong tank sunk in the ground, of about twenty or thirty feet in length, by somewhat less in breadth, and being about three or four feet deep, which was constructed on the side of a sloping bank; and into this flowed a little stream of water, conveyed into it by two wooden shoots, which projected a few feet over the tank. The sheep, being put into the water, were moved about under these shoots by means of long poles, having cross pieces of wood attached to their extremities to prevent the sheep from moving away when placed under the stream of water, and enabling those washing them readily to draw them to the side of the tank, and remove them from the water when sufficiently washed, which was readily accomplished by this arrangement.

The ground connected with this institution appeared to be of good quality, and amongst the crops which are cultivated there is maize, which is grown in considerable quantity as a forage plant. For this purpose it is sown either in drills about twenty inches apart, or is broadcast. When it has grown about two feet high, it is mown and given to the cattle either in its green state, or after being previously made into hay. It is again cut a second time, later in the season. A good deal of maize is grown for the same purpose in the central part of France, and in the north of Germany where the climate is too cold for its being successfully cultivated as a grain crop. It is sown at different periods, but I believe the usual time is about the latter end of April, or in the beginning of May; when then sown, it is fit for cutting the latter end of August or early in September. Cultivated for this purpose, it yields a very large quantity of highly nutritious food, which is admirably adapted for the fodder of almost every kind of cattle, at a time of the year when the heat and dryness of the season, prevent the growth of other green crops. It therefore appears to me highly desirable that our agriculturists should endeavor to introduce the cultivation of so useful a plant amongst our usual green crops.

A curious system of rotation is adopted on one part of the farm attached to the College, for the purpose of obtaining from the ground the greatest possible amount of food for their cattle; it is as follows:

1st year, Jerusalem artichokes, the ground being manured.
2nd " Jerusalem artichokes.
3rd " Vetches, sown together with trefoil.
4th " Trefoil, giving two cuttings.
5th " Trefoil, mowed once, and then pastured.

The manner in which they plant the potato there is different from what is generally adopted with us; for they dibble the seed in holes, which are measured with a stick, at certain distances apart. And when thus planted, as they come up, they have a regular and pretty appearance, and sufficient space is left for afterward earthing them up all round with either the plough or hoe. One of the professors of the College kindly took me over some of the principal parts of it and the surrounding grounds, and gave me much information as to the practical working of the institution.

From Stuttgart, I proceeded direct to Munich, the capital of Bavaria, which is situated about 150 miles by rail eastward of that city.

The part of this route lying between Stuttgart and Ulm passes through a picturesque and fertile district belonging to the kingdom of Würtemberg, and affords many beautiful views of the rich valleys of the Fils and Neckar. At Ulm, which is situated on the left bank of the Danube, in a beautiful and fertile country, at the southeastern foot of the Swabian Alps, the railway crosses that river, and passes into Bavaria, as it here forms the boundary between the kingdoms of Würtemberg and Bavaria. I understand that Ulm is being strongly fortified by the German Confederation, for the purpose of defending the rich valley of the Danube from the French.

Würtemberg, with the exception of a few small tracts, is considered one of the most fertile and best watered countries in Germany. It is rather hilly, if not mountainous in its character, and though it has no extensive plains, possesses many beautiful valleys and sloping hills which are highly fertile.

Great attention is paid in this kingdom to agriculture, and the system which is pursued for the most part appears to be good. Corn crops are very extensively grown, so much so that there is generally more raised than is sufficient for internal consumption, and much therefore is exported into other countries. The grain crop which is grown in greatest quantities is spelt. Green crops are in very general cultivation,—turnips, and especially mangold wurzel, being grown to clear the ground of weeds ; and the growth of those plants has, in a great measure, superseded the old system of fallowing. Potatoes are also grown in large quantity, not only for the food of man and cattle, but likewise for the making of a kind of spirit. Vines are cultivated to some extent along the sides of its hills and valleys, especially in that of the Neckar ; and I understand, in the higher regions of its mountains and hills, where the climate is too cold for the cultivation of grain crops, that these localities are covered with forests and pastures.

Leaving Ulm, the remainder of the route lies in Bavaria, and the country as far as Augsberg is undulating, and in some places highly wooded; but after passing that town it becomes exceedingly flat and uninteresting, diminishing at the same time in fertility; and the want of trees gives the country a very monotonous and dreary appearance. At one or two places along the line I passed bogs of peat, the cutting and preparation of which for fuel, reminded me of the turf-bogs of Ireland.

The country about Munich is exceedingly flat, it being situated in the midst of a very extended plain, so that for many miles before reaching that city, the cupolas and spires of its numerous churches are visible in the distance.

On reaching this very fine city, I took the earliest opportunity to call on Baron Liebig, of world-wide celebrity, to whom I had some letters of introduction. He received me courteously, and conversed with me for a considerable time on different subjects connected with the chemistry of agriculture, and told me of several interesting experiments he was then carrying on relative to the food and nutrition of plants.

I gave him to understand the object of my continental tour, and that I was desirous of working for a short time as a pupil in his laboratory, if he would permit me to do so. He informed me however, that, since he came to Munich, he had given up the instruction of laboratory pupils; and he directed Dr. Kœller, one of his assisting chemists, to show me his laboratory and chemical apartments, where I saw various objects interesting to the chemist. He also showed me some experiments which Baron Liebig was then carrying on in the botanic garden adjacent to his laboratory, relative to the food and nutrition of vegetables, and the effects of different saline and earthy salts on plants growing under various circumstances. Dr. Kœller also pointed out to me some experiments Baron Liebig was making to ascertain the amount of nitric acid and ammonia which was absorbed from the atmosphere, and received by the rain falling on certain quantities of clay placed in square metallic boxes, which were exposed to the air for a given time, and then the amount of nitric acid and ammonia absorbed was determined. These and other experiments, having some important practical bearings on agriculture, were by certain ingenious contrivances being very carefully carried out.

While at Munich, I paid a visit to the Royal Bavarian Central Agricultural School or College, at Weyhenstephan, which is near the small Bavarian town of Freising, situated about twenty-three miles by rail to the north-east of Munich. This agricultural school, which was formerly a monastery, consists of an extensive range of buildings, constructed in the form of a square, and is prettily situated on a hill commanding a fine view of the surrounding country. About 500 acres of gronnd are attached to this school for farming purposes; and they have on an average about eighty pupils, who reside in the college during their studies, which extend over a period of two years; a summer and a winter session (in which the pupils are obliged to attend certain prescribed courses) being embraced in each year. In connexion with the school is a very neat and well-kept museum, containing a number of elegant and ingenious agricultural models, specimens and casts of agricultural produce, and objects of natural history interesting to the agriculturist; as, for example, the insects that are injurious, and those that are beneficial to the farmer, the birds, and some of the smaller animals of the district. In addition to these, there is in the museum, a collection of philosophical instruments, used by the teachers in the instruction of their different classes.

Amongst the models, I saw a very simple and ingenious machine for extracting starch from potatoes, so as to save the pulp and cellular portion. In this machine, the rasped or pulverized potatoes are placed between two pieces of canvas, forming a kind of bag, over and under which a series of rollers are made to pass backwards and forwards, while at the same time a stream of water plays over its surface, and by this simple contrivance the starch is completely washed out, whilst the pulpy matter is retained; and this latter, being afterwards compressed and dried, is used with the best effect in the feeding of cattle. This ingenious machine was the invention of one of the professors of the school, who has recently, I was informed, patented it.

There is also attached to the school, a small but neatly fitted up chemical laboratory, where the pupils have to work for a certain period in chemical analysis. There is also a library, anatomical theatre, and other apartments designed for the instruction of the pupils attending the agricultural seminary.

In addition to the usual productions of the farm, there is made at the institution, on a considerable scale, cheese, starch, beer, and a rough kind of spirit. The director of the college, Herr C. Helferick, who kindly took me over different parts of it, showed me also their brewery, and explained the processes they adopt in making their Bavarian beer, which appeared to me to be the best I had tasted whilst in Germany. The system of instruction carried out in this agricultural school, appears to be very similar to that of Hohenheim and other agricultural institutions of Germany, and seems to be well calculated to give a sound and useful education in all subjects pertaining to the practical culture of the soil in its different departments. My visit to this valuable institution afforded much pleasure as well as instruction; and I was much struck with the neatness and order which were maintained throughout the entire establishment.

While at Munich, I visited the Royal Bavarian Central Veterinary School or College; and though the director, Dr. Fraas, to whom I had a card of introduction from his friend Baron Liebig, was absent, one of the teachers of the college very kindly showed me all through the institution, which is of very considerable extent being, I believe, the largest veterinary school in Germany. This college, which is in part supported by the State, is situated close to the town, and consists of a number of well-built and commodious apartments and offices, for the instruction of pupils, and the accommodation of the different animals received into this institution; and the stables for the horses under medical treatment struck me as being particularly fine and well constructed. This school possesses a most extensive and valuable collection of anatomical and pathological preparations, illustrative of the anatomy and the diseases of horses, as well as of other domestic animals, some of which are very interesting and beautifully preserved. In going through this collection, I observed that the preparations, which were mounted in spirit, had the mouths of the bottles closed in a somewhat different manner from what I have seen adopted elsewhere, viz, their flat lips having been ground quite smooth, circular pieces of flat glass, being cut somewhat smaller than the outer rim of their lips, were, (after the preparations had been placed in them) securely fastened on as covers, by merely placing a layer of common putty round their edges; and I was informed that this simple method was found to answer the purpose better than any other they had yet tried. There is a very neat little chemical laboratory and lecture-theatre connected with this school, where the students are obliged to attend certain courses of chemical lectures, and work in practical chemistry. There is also an anatomical theatre, so constructed that the horse or other animal may be easily brought into it alive; and there are arrangements there by which it can be firmly secured, in order to illustrate its different points, or be operated on, before the class. The institution likewise possesses a large smith's forge, where the pupils are obliged to practice the shoeing of horses and oxen; and finally there is a small botanic garden, where different medicinal plants used in the treatment of animals are grown for illustration.

The staff of teachers connected with the college are, the director, four professors of different branches of science connected with the veterinary art, two assistants, and one smith. The instruction extends over a period of two years, and appears to be very complete, embracing all the departments of veterinary science.

Before leaving Munich, I visited also the Physiological Institute, which is an institution devoted to the advancement of physiological science in its different departments, and is, I believe, one of the largest and most complete schools of the kind in Europe; and has some very distinguished men attached to it, amongst whom are Professors Bischoff, Pettenkofer, and Fehling, whose labors have done much already to advance physiological science. It is a well-constructed building, having a fine anatomical theatre, and a series of experimental rooms and apartments belonging to each of its professors. Amongst other objects of interest that I saw there, was a new apparatus which had been recently devised by Professor Pettenkofer, in order to determine more accurately the changes which food underwent during the process of digestion in man and other animals, by collecting carefully the entire products of respiration, and the excretions eliminated in a given time, the individual or animal being fed on a certain quantity of food, the composition of which has been accurately determined beforehand. The apparatus consisted of a large chamber, which was made by riveting together sheets of iron air-tight, as is done in the construction of boilers. This chamber was large enough to contain comfortably one individual, together with a bed; and, by an ingenious contrivance, an arrangement was made, by which food could be supplied, from time to time, without the admission of air, except a small quantity whose amount was known. The subject under experiment being placed in this apartment, its door was closed air-tight, and a current of atmospheric air was drawn through it at a certain rate by means of a steam-engine, and afterwards made to traverse a series of tubes filled with strong sulphuric acid, chloride of calcium, and caustic potash ; all of which, previous to the commencement of the experiment, had their weights accurately ascertained. A comparative experiment was at the same time made with the air of the outer apartment, in which this apparatus was placed. At the close of the experiments, which were carried on for several hours, and in some cases days, all the tubes were carefully re-weighed, and the excess of increased weight in the sulphuric acid, chloride of calcium and potash tubes, in the case of the air drawn through the apparatus, over that produced by the air of the outer apartment, indicated (as is well known in chemical analysis) the amount of water and of carbonic acid which had been exhaled from the lungs and skin of the subject during the period the experiments were carried on. The excretions, likewise, which were passed during the same period being all carefully collected, and retained by a suitable arrangement, their composition was afterwards ascertained by a chemical determination of their constituents.

In this way, Professors Bischoff and Fehling have very accurately determined what portions of our food ultimately pass off by the lungs and skin, and what are eliminated in the excretions, which are points of much interest and practical importance. I have as yet been unable to see any published account of the results of Professors Bischoff and Fehling's experiments with this apparatus ; but if I rightly understood Dr. Ranke, the German gentleman who kindly took me to see the Physiological Institute, and showed me this apparatus, their experiments led them to the following conclusions, which confirm in different particulars the results of Professor Haughton, of the Dublin University, and other gentlemen who have previously investigated this subject:

1st. That the nitrogenous portions of the food went to repair the continuous waste of the nitrogenous tissues of the body which takes place during the performance of its various functions ; and that urea was the form under which the metamorphosed or worn-out nitrogenous tissues were chiefly eliminated from the system.

2nd. That when an excess of nitrogenous matter was supplied in the food, more than was sufficient to repair the waste of tissue, that excess had the effect of producing a more rapid formation and subsequent breaking up of tissue, and consequently increasing the amount of urea eliminated in a given time ; but that the increased quantity of urea occurring in the urinary secretion was not due to the excess of nitrogenous matter being converted directly into that substance, as some have supposed, but that its constituents first formed a portion of the tissues which, by their subsequent metamorphosis, furnished urea.

3rd. Their experiments also showed that little or no nitrogen passed off with the fœces, or with the product of respiration, but that almost the whole evolved was contained in the urinary secretion.

From Munich I proceeded by rail to Frankfort-on-the-Maine, going by Nürnberg. The greater part of the country along this route, which lies almost entirely in the kingdom of Bavaria) is exceedingly flat and uninteresting, and presents nothing very peculiar in its agriculture ; and from what I have seen and learnt of Bavaria, its agricultural industry appears to be principally directed to the cultivation of wheat, rye, barley and oats; and, next to grain crops, the vine and hop plant are amongst the most important objects of cultivation, the latter being extensively grown for its use in making the celebrated beer of that country. After leaving Nürnberg, the country as we approached Frankfort became more interesting, and was in some places highly picturesque, affording several beautiful views along the line of the river Maine, winding its course through wooded hills and fertile vales.

From Frankfort I took a day's excursion to Giessen (the capital of Upper Hesse, which is about forty-one miles by railway to the north of that city, and is prettily situated on the river Lahn), as I was very desirous of visiting the chemical laboratory of its university, which has acquired such celebrity from the researches of Baron Liebig and other distinguished chemists which have been carried on there. Arriving at Giessen, I called on Professor Will, who has succeeded Baron Liebig, as professor of chemistry to that university. After having some conversation with him, he directed his assistant chemist to conduct me through the laboratories and chemical apartments of the university, as he was not himself very well the day I called. In going through this department of the university, I saw where Liebig had worked so successfully for a number of years, and where some of the most distinguished chemists of the day had studied under that great teacher of chemical science; also I was pointed out the apparatus with which some of his most brilliant discoveries had been made, and many other objects of considerable interest to the chemist.

The same gentleman who conducted me all through the series of laboratories and chemical apartments of the university, kindly showed me some very striking experiments with the prism, illustrative of its use in chemical analysis. The apparatus he exhibited was simply a wedge-shaped vessel of glass, which, being filled with a very dilute solution of sulphate of indigo, was placed in front of the flame of a jet of coal-gas, and then a platinum wire, being dipped in different metallic solutions, was placed in the flame and afterwards viewed through the prism, when different phenomena were observed, which were in some cases highly characteristic and thus afforded a very delicate and ready means of detecting the presence of different metals and their salts.

I was so much pleased with the experiments which I saw with this simple instrument, that on my return I got one constructed for the use of the laboratory of this Society, and have no doubt it will prove of much use in different analytical operations carried on there. Finally, I obtained much information as to various methods of analytical determination, &c., employed in that celebrated chemical laboratory, which has been so intimately connected, not only with the advancement of chemical science, but likewise with that of agriculture during the last quarter of a century.

In going from Frankfort to Giessen, I passed by the salt-works at Nauheim, and saw from the railway-carriage the arrangements adopted for concentrating the brine at those works, where, I understand, there exists a remarkable natural brine-fountain, which issues at certain intervals with great velocity from an opening in the ground, and is propelled upwards to a considerable height. This arrangement, as well as I could see from the railway, consisted in letting the brine trickle down from a considerable height through a quantity of furze bushes placed on a large kind of framework, to the top of which it was conveyed. In this manner a very extended surface of the salt liquid was exposed to the air, by which its evaporation was greatly accelerated.

From Frankfort I proceeded by the Taunus railway to Wiesbaden, the capital of the Duchy of Nassau, which is situated in a beautiful valley, surrounded by picturesque hills, and is celebrated for its mineral baths and hot springs. Arriving at this very fashionable German watering place, I visited the agricultural school or college at Geisberg, which is the chief agricultural seminary of Nassau, and is beautifully situated on a hill, a short distance from the town, commanding a very fine view of the valley of the Rhine and the surrounding country. The director of the college was not there when I called, and I was unfortunately unable, in his absence, to see the interior of that institution. I walked, however, about the garden and grounds connected with the school, and saw the different vegetables and crops grown there, and their methods of cultivating them. A very excellent practice is there adopted of illustrating on the farm the various systems of agriculture practised in different countries, by which means the pupils of this institution are very clearly shown wherein they differ from each other, and are themselves enabled to judge of their comparative merits. There is a good garden and nursery, as well as a large piece of ground, devoted to experiments on various seeds and plants, where I saw, amongst other vegetables, a large variety of different kinds of potatoes growing in great luxuriance. I understand that in this college, courses of lectures on the following subjects, viz, on natural history, mineralogy, botany, zoology, technology, veterinary surgery, the theory of agriculture, and agricultural book-keeping, are delivered, which constitute a part of the curriculum of instruction communicated in this institution, which can be easily completed by the students in three winter half-years. As to the summers embraced during that period, these they are recommended to spend on some of the best managed farms in the neighborhood, in order to acquire a more thorough knowledge of practical agriculture; and, with this view they are generally boarded in the summer with some of the best farmers of the district.

Before leaving Weisbaden, I paid a visit to the chemical laboratory of Dr. Fresenius, which is situated in a fine open part of the town, and is in connection with the residence of that gentleman to whom it belongs. I was not fortunate enough to find Dr. Fresenius there when I called, as he was absent from Wiesbaden. One of his assistants, however, very kindly conducted me all through the different laboratories, apparatus-rooms, and other apartments connected with this institution, the object of which is, to give instruction in the principles and practice of chemical science to those who are either intending to make chemistry their profession, or are desirous of acquiring a general knowledge of that science, as an auxiliary in the pursuit of other professions. In this school of chemical science, the different laboratories, and the compartments in each, are so well arranged, that every student may work separately in whatever department of chemistry has the most direct bearing on the object of his studying this branch of natural science which is obviously a very great advantage.

I was greatly pleased with those laboratories, which appeared to me to be the best constructed and most completely furnished of any I had seen elsewhere in Germany or in other parts of the Continent. Dr. Fresenius has likewise made a number of very ingenious arrangements, which have the effect of economising time and labor, and obviating more or less disagreeable circumstances connected with the different branches of chemical research. Some of those arrangements I took sketches of, that I might afterwards adopt them in the Society's laboratory. I obtained, also, some information which I was desirous of knowing as to the methods employed in this celebrated school of chemistry in different analytical determinations.

Leaving Wiesbaden, I returned by the same line of railway I had last traversed as far as Cassel, where I got aboard one of the Rhine steamers, and proceeded down that noble river as far as Bonn, where I remained for one day, being desirous of visiting the agricultural college at Poppelsdorf, which is situated near that town. This college, which is about a mile from Bonn, and close to the small village of Poppelsdorf, is a good substantial building, possessing some excellent apartments for the instruction of its pupils in the various branches of knowledge connected with agriculture which are taught in the institution. It possesses a small but well-arranged museum, containing a number of agricultural models, specimens, and casts of various agricultural products and the objects of manufacture connected with agriculture. It also has a library, reading-room, and several lecture-theatres. The offices adjoining the principal building are very good and well constructed and one of them is devoted to a chemical laboratory.

In the centre of the farm-yard adjoining the College is a large open dung-pit, into which all the litter of the cattle fed in the yard is placed, and the sewerage of the entire establishment flows. Into this, at certain periods, water from a neighboring stream is conducted; and, after it has remained in contact with the dung for a certain time, the fluid portion is allowed to flow into an adjoining reservoir, furnished with a powerful forcing-pump, which, by a series of canvas tubes or hoses screwed on to it, readily distributes the liquid manure to the fields and meadows surrounding the

College; and I was informed, that this mode of manuring was found to be attended with the best results.

There is an "Economic Garden" attached to this institution, which, though it is little more than an acre in extent, has nearly a thousand different plants growing there, and those are selected which are most likely to interest the agriculturist. This garden is divided into small squares, one of which is devoted to each kind of plant or vegetable under cultivation; and in order to facilitate the reference to any particular one, there is a map of the garden, where each of the squares are indicated and numbered, in accordance with the figures attached to the squares in the garden; so that, by referring to this map, with its accompanying catalogue, the place where any plant grows in the garden may be quickly discovered.

A series of experiments are also carried on with great care, and the plants under experiment are placed in small squares which are surrounded by well-tarred boards, forming, in fact, a kind of box, of about 6 feet in length by 4 in breadth, and about 4½ feet in depth. In these are placed different soils, composts and mineral manures—the object of such experiments being to test the correctness of some of Liebig's doctrines respecting mineral and other manures.

The chief object of this institution is to give a sound and practical agricultural education to young men who purpose becoming land-stewards or farm-bailiffs; but, in addition to this, it has, as a subordinate object, the instruction of lawyers and gentlemen in all matters relating to landed property. This instruction is communicated by means of lectures, and by witnessing and taking part in the practical operations of the field and stall. The indoor course of study seems to be most comprehensive, and appeared to me to embrace every species of knowledge likely to be of practical use to the agriculturist. The course of instruction is divided into four terms which occupy about two years, The pupils do not either board or reside in the college, but lodge in the town, where they can obtain apartments very cheaply.

I visited also the Botanic Garden at Bonn, which is situated close to the Agricultural College, and commands a fine view of the Drachenfels and the adjacent hills of this very beautiful portion of the Rhine. The garden is small, but possesses a good general collection of plants; and I observed there a great variety of grasses, cereals, and other plants interesting to the agriculturist. Close to the Botanic garden is the Museum of Natural History, which is very extensive, and possesses a fine collection of birds, fossils, and minerals, which are well displayed and arranged in the extensive suite of apartments in the château of Poppelsdorf, which was formerly the palace of the electors of Cologne, but is now devoted to this very valuable collection of natural history.

In coming down the Rhine, from Cassel or Mayence to Bonn, not one of the least striking features in the very picturesque scenery there presented is the extent to which the vine is cultivated, clothing almost everywhere the banks and hills of this portion of the river; and there is scarcely any spot so steep or inaccessible, if it affords a favorable aspect, on which this plant is not grown; and much of the natural beauty of the scenery of the river is thus lost by the manner in which the more bold and rugged portions of its hills and sloping banks are cut into patches and terraces for the cultivation of this plant. And what still more detracts from the picturesque effect produced by its cultivation is, that, instead of its being trained in graceful festoons, it is made to grow round stunted poles, which (in the early season of the year especially, before the vines are in full leaf) form anything but pleasing objects for the eye to rest on.

I understand that a number of different rotations are adopted by the farmers along this portion of the Rhine, amongst which are the following:

1st year,		Fallow.	1st year,		Potatoes, manured with farm-yard manure.
2d	"	Rye or wheat.	2d	"	Barley.
3d	"	Peas.	3d	"	Clover.
4th	"	Potatoes, manured with a mixture of sheep-dung, litter from stables, and chalk.	4th	"	Pasture and a half fallow, upon which colza is sometimes sown in drills.
5th	"	Oats, with clover.	5th	"	Colza.
6th	"	Red and white clover, mixed with rye-grass.	6th	"	Wheat.
7th	"	In pasture.	7th	"	Maize, cut green for forage.
8th	"	In pasture.	8th	"	Rye.
9th	"	In pasture.	9th	"	Beet-root, manured.
10th	"	Oats or buckwheat.	10th	"	Oats.

Mr. Banfield, in his little work on the Rhine, states that a common rotation, on the left bank of the river, in the neighborhood of Coblentz, is the following:

1st year, Fallow, with 12 to 16 loads of dung to the morgen.
2d " Rapeseed.
3d " Winter barley.
4th " Wheat.
5th " Clover, with gypsum, 2 cwt. to the morgen.
6th " Oats.

And in the sandy soil, further from the river, he gives the following as being adopted:

1st year, Fallow, with dung.
2d " Rye.
3d " Clover, limed, and soiled with ditch-cleanings.
4th " Wheat, with dung.
5th " Buckwheat.
6th " Rye, with dung.
7th " Oats.

Chesnut trees appear to be very abundant in the Rhenish districts, and I understand that their nuts are used in considerable quantity by the peasants as an article of food, which are eaten by them either plain, after being roasted, or having been boiled with other vegetables. They are also used as a fodder for cattle; and for this purpose they are well adapted, as they contain a large proportion of albuminous and flesh-forming substances.

At Bonn I again got on board one of the Rhine steamers, and proceeded down the river as far as Cologne. This portion of the Rhine is very flat and uninteresting, when compared with that between Cassel and Bonn: it is not, however, devoid of natural beauty, and the villages along the banks give variety and interest to the scene. The country, too, appears to be rich and well cultivated.

From Cologne, I proceeded direct by rail to Brussels. In the neighborhood of the former town, large farm-houses are here and there to be seen, and some of the extensive farms connected with them appear to be well managed; and I understand that one of the rotations there adopted is the following, viz., fallow, wheat, rye, clover, oats, rye.

For some distance before reaching Achen or Aix-la-Chapelle, the railway passes through flat and very extended plains, the soil of which appears to be of the poorest description, and the district has a very monotonous and dreary aspect. Shortly, however, after leaving that town, the country between it and Verviers becomes more varied and picturesque, and in its general appearance and agriculture is not unlike some parts of this country. Fine pastures may be seen along the sides of the sloping hills, on which numerous cattle were observed grazing. And in addition to the other agricultural productions of this locality, I understand that a considerable quantity of cheese is made here, which is celebrated for its superior quality. I am informed that, in winter, the chief food of the cattle consists of chopped straw, together with roots and oil-cake, as the quantity of hay obtained in this district is rather small.

The railway between Verviers and Liege passes through a highly picturesque country, and many very beautiful views are presented along the line, some of which strongly reminded me of different scenes in North Wales. As to the crops grown, potatoes and oats appear to be very extensively cultivated here, as well as in that district lying between Verviers and Aix-la-Chapelle.

In going from Liege to Brussels, the railway passes through a fine agricultural district, where a variety of crops appeared to be growing in great luxuriance, though the country itself is rather flat and unpicturesque.

At Brussels my stay was very short, as I was unable to learn that there was anything particularly interesting in an agricultural point of view in the immediate vicinity of that city. Before leaving, however, I visited the Botanic Garden, the conservatories of which, situated on an elevated site, form a very striking and picturesque object viewed from one of the boulevards opposite. The interior of those conservatories are well worthy of a visit, not only on account of the several fine plants they contain, but likewise for some very prettily constructed aquariums, having in them a number of interesting fresh and salt water animals. I saw also there what I have not observed in other conservatories, that a number of the largest plants were grown in zinc vessels, which appear more neat, and are, probably, more durable than either the usual earthen pots or wooden tubs.

I visited also the extensive Museum of Natural History at Brussels, and amongst other objects that attracted my attention in that collection was the ingenious contrivance by which the different preparations in bottles were kept supported in the spirit; which consisted in merely attaching them to little glass floats, or balloons, having small hooks at the bottom, which, floating on the top of the fluid, kept the preparations in an upright and suitable position.

From Brussels I proceeded by rail direct to Bruges, in order to become better acquainted with the agriculture of Flanders—a country which is so deservedly celebrated for the progress it has made in that important art, as well as practical science. The country in passing from Brussels to Bruges presents little to interest the traveller, being on the whole rather flat and tame in its character; but to the eye of the agriculturist it abounds in objects of interest (especially that portion between Brussels and Ghent), from the richness and variety of its vegetable productions, which, being grown in rather small divisions, give the country the appearance of a rich and well-stocked garden. The hop is grown to a considerable extent in this district, especially in the neighborhood of Alost, where also there are numerous rich meadows.

Arriving at Bruges, which is the chief town of Western Flanders, and is situated in the centre of a highly interesting agricultural district, I took an early opportunity of getting a good general idea of the country, by ascending the lofty belfry-tower in the Grande Place, from the upper gallery of which I obtained a most extensive view of the surrounding country, which fully repaid me for the fatigue of toiling up the four hundred and two steps I had to ascend in order to reach this commanding point of observation, which, besides its affording a scene of much agricultural interest, is worthy of a visit on account of its celebrated chime-bells, which are said to be the finest in Europe. These bells, forty-eight in number (some of them being of huge dimensions), are struck by one hundred and forty hammers, which are worked by a curious system of machinery, and are made to chime every quarter of an hour, producing notes that are most agreeable from the sweetness and richness of their tones.

The country around Bruges is remarkable for its flatness, so that viewed from an eminence, as from the belfry-tower, it appears, as far almost as the eye can reach, to be an extended plain, varied however in its appearance by the great variety of crops growing in a high state of cultivation, the orchards, the clumps and avenues of trees, the wind-mills, farm-houses, canals and other objects, rendering the whole scene replete with interest to the agriculturist. Descending from the belfry-tower, I took a drive of some distance into the country, in order that I might observe more closely the nature and condition of the various crops, how they were cultivated, and other matters connected with the agriculture of this part of Flanders. I was much struck with the richness of the various crops I saw, especially the wheat and rye, which were growing in a most luxuriant state in the vicinity of Bruges. I remarked also the cleanness and well-cultivated condition of the fields, many of which were bordered with narrow stripes of grass, which, in addition to their use in dividing the crops and fields, were made available for grazing cattle, and gave the fields a remarkably neat and well-trimmed appearance. The entire absence of fences, too, cannot fail to be remarked, which are replaced by broad ditches or large open drains, that not only serve the purpose of fences in dividing different holdings, and preventing trespass, but likewise assist in the drainage of the wetter portions of ground, by furnishing channels for conveying away the water of the smaller drains, and affording a convenient supply of water for irrigation and other useful purposes.

I shall now offer a few remarks on what appear to be some of the more characteristic features of Flemish agriculture. The first, and perhaps the most striking, of these, is the great attention that is paid to the collection and preservation of a number of substances which are used as manures (many of which are suffered to go to waste with us), and their very liberal application of them to the soil, particularly in the liquid condition. I have not space here to enumerate the great variety of substances that are employed in Flanders as manurial agents, but will only briefly describe how they collect, prepare and apply their liquid manure (*engrais liquide*), which constitutes the chief and most important manure employed by the Flemish agriculturist. The term "engrais liquide" does not merely signify the liquid manure obtained by collecting the fluid excrements of the animals of the farm-yard, but it embraces also a liquid manure which is manufactured from various substances at considerable trouble and expense. The substances that are chiefly employed for this purpose are night-soil and rapeseed-cake, which are not only used together with different refuse substances to manufacture liquid manure, but are also frequently added to that obtained from the farm-yard to increase its amount, where of itself it would be insufficient for the wants of the farmer.

For the purpose of collecting and preparing liquid manure, which is so universally employed in Flanders, a manure-tank forms an essential part in the construction of every farm-yard, whether the ground connected with it be the small plot of the humblest agriculturist, or the extensive farm of the rich landed proprietor; and this system of having manure-tanks has, in a great measure, arisen from the necessity of having such convenient receptacles for the droppings of the cattle, which are much more housed in that country than with us all the year round.

This tank, which is usually constructed of brick, and has its bottom and sides rendered water-tight with cement, is generally built under the stable or byre, so that the liquid excrements of the animals can easily flow into it; and by means of an aperture outside the steadings, the liquid can be readily removed at any time by means of a pump or ladle, when required.

Night-soil, which we suffer in great part to go to waste, by allowing it to be carried down into our rivers, rendering them more or less impure and unfit for many domestic purposes, is held in high esteem by the Flemish agriculturists, and the saving and collecting of it form a material point in their rural economy; and they even go to considerable expense to obtain from the neighboring towns additional supplies of that substance, which are brought to them in peculiar carts or barrels constructed for that purpose.

This night-soil they apply as manure, either in the state they receive it, or after having first mixed it with water and rape-cake; and when so prepared, it forms what they term "d'engrais flamand," which manure is employed chiefly in the cultivation of their industrial plants, as, for example, flax, colza, tobacco, and hops, which are most extensively grown in different parts of Flanders.

Two different methods are adopted in the application of liquid manure, viz: it is either applied directly to the stem and roots of the plants, or it is diffused generally over the soil, where they are either growing, or intended to be grown; and the employment of either of those methods depends on the nature of the plant under cultivation, and the season of the year.

Different simple arrangements are adopted for the distribution of the liquid manure, which is brought to the field in barrels, or peculiar carts constructed for that purpose; the following is one of those which is much employed in some districts: a cask or barrel, having an aperture in its top and bottom, which can be opened by drawing a string, is placed on a frame to which wheels are attached, so that it can be drawn by a horse; the person who is distributing the manure sits on horseback, and when he comes to where he wishes to apply it, he has only to pull the string, and the liquid flows out of the lower aperture against a flat board placed in front of it; and by this simple contrivance the manure is spread evenly over a space of several feet, though issuing from one aperture, and the quantity which is applied is regulated by the rate at which the horse is made to move.

In other cases, particularly where the manure is to be applied to the roots of the plants, it is distributed by means of ladles with long handles attached to them; and on small holdings, where the occupants have but few to assist them in the culture of their ground, the liquid manure is frequently distributed by strapping a small barrel filled with it to the back of a laborer, who, by means of a flexible tube connected with an aperture in the bottom of a barrel, can readily distribute the manure where it is required. In the application of manure, the Flemish farmers are not content with manuring the ground most liberally before the sowing of the seed, but they apply it afterwards at different stages of the growth of the plants under cultivation; and this frequent application of manure accounts, in a great measure, not only for their success in raising good crops, but likewise for the rapidity with which they obtain them, which has surprised those acquainted only with the slower methods of cultivation as practiced in other countries.

Another peculiarity in the agriculture of Flanders is, the great amount of labor there bestowed on the soil in their repeated and deep tillage of it. This is effected in some districts by the use of the plough, and in others by the spade, or frequently by the combined use of both; for after the plough has opened the furrows, a person often follows deepening them with the spade, and throwing up the earth on the part already ploughed. By this means a greater depth of soil is exposed to the action of the air, which produces in it many beneficial changes; and by the subsequent ploughings and harrowings to which it is subjected, is brought to a very fine tilth, and placed in the most suitable condition for the cultivation of the intended crop.

Combined with this frequent working of the soil is the careful weeding of it, and there is, perhaps, no other nation that take so much pains as the Flemish to free their land from weeds, and keep it clean; so that one of the features of the agriculture of Flanders that a visitor cannot fail to remark is the cleanliness of the ground, and the freedom of their crops from weeds.

Another striking feature of Flemish agriculture is that, according to their system, the land is kept continually cropped, and not allowed to remain in fallow; and they manage to take what they term *recoltes de robees* (stolen crops) between the reaping of one and the sowing of another, as, for example, turnips or spurry between wheat and rye.

They also frequently adopt a system of simultaneous cropping, as the sowing of clover or carrots between corn or flax; and, not satisfied with obtaining alternate crops of cereals and of root or forage plants, the Flemish farmers get from the same soil in the same year two crops, as, for example, oats and turnips, rye or flax and carrots, wheat and spurry, &c.

Those agriculturists also, in the rotations of their crops, not only alternate with the usual root and forage plants, but likewise with some of the numerous industrial plants they cultivate, amongst the most important of which are colza, flax, hemp, and hops; this makes their rotations extend over longer periods than with us, where a much smaller number of plants are usually grown by the agriculturist.

To conclude these brief remarks on the agriculture of Flanders, a farm in that country has more the appearance of an enlarged market-garden with us, where the most liberal and repeated applications of manure (especially in the liquid condition), the frequent digging and ploughing of the soil, and its continuous cropping with a great variety of different plants, had constituted the principal features in its cultivation.

Leaving Bruges, I proceeded by rail to Ostend, passing through a very flat country, intersected by numerous canals and large open drains, which, amongst other useful purposes, are made to carry off the excessive water of this rather wet and low-lying district, where, however, the crops, as far as I could judge, appeared to be good and well cultivated.

The vicinity of Ostend affords some fine examples of lands which have been reclaimed from the sea by embankments; these are termed Polders; and when once those lands are secured from the influx of the tides, they become most productive soils, requiring little or no manure in their cultivation. One of those reclaimed lands, the polder of Snaerskerke, near Ostend, has, I understand, an extent of 1300 acres; and, from being a comparatively worthless tract, has since its reclamation become highly valuable agricultural land.

From Ostend, I crossed over by steamer to Dover, and from it proceeded direct to London. Arriving there, I took a day's excursion to Kelvedon (a small village about forty-two miles to the north-east of London), as I was anxious, before returning to Ireland, to see the celebrated farm of Alderman Mechi, at Tiptree

Hall, which is situated about four or five miles from that village. The extent of this farm is one hundred and seventy acres; and this, from being an almost barren spot, that gentleman has converted into a well-conditioned and highly profitable farm, where I saw very fine crops of wheat, oats, and clover, growing in great luxuriance.

Mr. Mechi's system of feeding and fattening stock appeared to be excellent, and, with his most perfect arrangements, I have no doubt, is very successful; the following is a very brief outline of the method adopted. The young cattle are first put into a large airy shed, where they can freely move about and have sufficient exercise for their healthy growth and development. After being kept so for about a year, they are removed to smaller sheds, having boarded floors, which are so constructed that the droppings of the cattle can pass freely down between the interstices of the boards into tanks placed beneath. By this arrangement the manure is all collected, the cattle are kept clean and dry, and there is no straw or other substance required for littering them. When the droppings have accumulated in the tanks, they are removed from them at different periods as is found necessary; this is effected by allowing a certain amount of water to flow into each tank, so as to render its contents sufficiently liquid; air is then forced up from the bottom of each by means of a steam-engine, in order to mix thoroughly the water with the animal excrements; and, finally, the liquid so obtained is allowed to flow into a large circular tank built under ground, the dimensions of which are thirty feet in its greatest diameter in height and breadth, and capable of holding about eighty thousand gallons. From this the liquid manure is forced by a pump, worked by steam, into the system of iron pipes Mr. Mechi has laid down throughout his farm. These are furnished at certain distances with taps, having cocks which appear over the ground, and are for the purpose of screwing on flexible tubing, to distribute the liquid manure, which is forced out of a half-inch jet at the rate of eighty or ninety gallons per minute (when the steam-engine is working with only medium power). This force causes the jet of liquid to rise to a considerable height in the air, from which it falls in the form of a fine shower, distributing the manure very evenly over the ground. This system of manuring has been found by Mr. Mechi to be attended with the best results; and it appears to me to have only one drawback, namely, the great outlay it requires in the first instance to erect the necessary machinery, and lay down the system of pipes, which would require a far greater capital, I fear, than most agriculturists have at their disposal. I was much struck with Mr. Mechi's well-constructed farm-offices, and with the many ingenious mechanical arrangements that gentleman has adopted (several of which I was informed were of his own invention), by which the one steam-engine of six-horse power is made not only to distribute the liquid manure over the whole farm, but likewise perform all the mechanical operations of the farm-yard, where steam-power could be advantageously applied. And at the same time the waste steam and heat were as far as possible economized for the dressing of the food for the cattle, as most of what they receive is previously cooked, and given warm, which practice Mr. Mechi has found to be attended with the best effects in the feeding and fattening of stock. I was greatly pleased with my visit to this farm; and his bailiff, James Drane, took the greatest pains to show me everything of interest belonging to the establishment, and gave me much detailed information as to Mr. Mechi's system of feeding stock, the application of his liquid manure, and other points connected with the practical working of the farm at Tiptree Hall.

Before leaving London, I visited the Royal Veterinary College at Camden Town, that I might obtain some information relative to that institution, as the Royal Dublin Society had it in contemplation to attach a veterinary school to its other departments. This excellent college was instituted in the year 1791, and parliamentary grants were at first liberally given for its support; but for the last fifty years it has been independent of such aid, and is now maintained by the subscription of its members, and the amount received from its pupils, and for the animals under treatment, together with the liberal donation of two hundred pounds per annum which it has for some time past received from the Royal Agricultural Society of England. The College is well situated, and occupies a space of ground of about two acres in extent, and comprises an ample range of stables, an infirmary, museum, lecture-theatre, dissecting-rooms, &c.; and has several good open sheds and yards.

There are four professors, besides a demonstrator, and a dispenser and clerk, attached to the college, which has accommodation for sixty-five horses, besides that for other animals. The average number of pupils attending this institution is about one hundred; and the course of instruction, which appears to be very comprehensive, extends over a period of about two years, embracing two sessions, during which the pupils must attend certain courses of lectures, clinical instruction, and dissect as many subjects as is thought necessary to enable each to acquire a sufficient knowledge of practical anatomy.

At the termination of the first session the pupils are examined by the different professors of the college, with a view to ascertain the progress they have made in their studies; and at the end of the second session, if they have conformed to the rules of the institution, they are subjected to a preliminary examination, conducted also by the professors; and if their answering should be considered satisfactory, they receive certificates, stating that they have been duly educated in the science of veterinary medicine, and are eligible to undergo their final examination for their diploma, which is conducted by a court of examiners appointed by the Council of the Royal College of Veterinary Surgeons.

Should, however, the preliminary examination of any pupil prove unsatisfactory, he is informed by the principal of the college wherein he is defective, and is directed as to his subsequent course of study, before he can present himself again for examination. This system of examinations adopted by the college appears to be well calculated to test the progress each student has made during his studies, and to ascertain afterwards whether he has received a sufficient education to practice as a well-qualified veterinary surgeon.

Leaving London, I returned to Dublin, going by Windsor, as I was desirous of seeing the farm of the late deeply lamented Prince Consort, which is situated near that town. Arriving there, however, I found that I had not sufficient time before the starting of the only train by which I could proceed that day, to visit the Prince's chief farm, which is at some distance from Windsor, and was therefore merely able to inspect the farm-offices near Frogmore House. I was greatly pleased with the completeness of the various arrangements I saw there; and the dairy, which I was informed was planned by the late Prince himself, is quite a curiosity, and is well worthy of a visit to Windsor to see it alone. Its exterior forms a very picturesque building, and its interior is exquisitely fitted up; and the various arrangements for keeping the milk at a proper temperature, both in winter and summer, are most perfect. I was fortunate in visiting the cow-house just as the animals were brought in to be milked to supply the royal household ; and I did not know which to admire most, the beauty of the cows (some sixty in number), or the scrupulous cleanliness of the well-constructed and airy apartment in which they were placed, which might indeed, form a model to the agriculturists of the present day of what a cow-house ought to be.

I had also an opportunity of seeing there some very fine pigs, that were shortly to be exhibited at an approaching cattle show. I was conducted through the farm-offices by the resident superintendent, who very kindly drew my attention to the different objects of interest, and gave me much information relative to the working of this farm, &c.

In conclusion, I beg to state that the foregoing notes must necessarily contain but a very limited portion of the information I have derived from my tour on the Continent ; I hope, however, at some of my lectures delivered in the Royal Dublin Society, to have the opportunity of communicating to the public fuller details of different matters I have here merely noticed, as well as to give other information connected with the agriculture of the Continent, the insertion of which in these notes would make them much too extended.

ESSAY ON THE CULTURE AND MANAGEMENT OF TOBACCO.

By L. J. Bradford, of Augusta, Ky.

The success of a growing crop of tobacco depending much upon early planting, the selection of such situations for plant beds as will insure a proper exposure to the sun, is all-important. The eastern or southern slopes of hills, near their base, afford the best locations, the beds so situated being free from sobbing, and the warmth of the sun greater than upon flat surface. Regard should also be had to the character of the soil. It should be sufficiently close to render it retentive of moisture, and yet contain sand enough to give it quickness; made earths and puffy soils are unfit, being both too arid and liable to heave. Beds prepared in the early part of the season require more burning than those at a later period. There is but little danger of burning too hard, however, at any time, as the plants generally succeed best upon the beds most thoroughly burned. After the beds are thus burnt and cooled off, they are dug up with a common sprouting hoe to a depth sufficient to afford the plant a loose soil in which to extend its roots. Care should be taken to leave the surface soil as much on top, in the preparation of the bed, as possible, as the young plants will take a quicker and better growth. After the bed is well pulverized by hoeing and raking, the seed, mixed with dry ashes, is to be sowed as evenly as possible over the surface, at the ratio of a common table-spoonful to every eighty square yards (cubic measure), the bed lightly raked over or trodden evenly with the feet and well covered with brush, on which there should be no leaves, and protected from the intrusion of stock. So soon as the young plants attain the size of a dollar, the brush may be removed; if the weather is dry the brush may be suffered to remain to advantage, and when removed taken off in the evening; with seasonable weather, the plants will soon be large enough for transplanting.

The land designed for the crop should be fertile; if not naturally so, should be made so by manuring. Any common manure will answer a valuable purpose, tobacco being a plant that delights in a rich soil. The land should be deeply and thoroughly plowed, whenever practicable, in the fall or winter. In this there is a two-fold advantage. 1st. It destroys many insects that injure or destroy the young plant. 2d. It renders the land more friable and more easily cultivated. As the season approaches for planting out the weed (which is here from May to July), the land should be plowed again and kept clean. It is then to be laid off with a plow three and a half feet one way and three feet the other, and a small hill made in or on the check, as may be preferred, for the reception of the plant. The hill should be raised a little above the common level of the surface—the size of the hill being a matter of fancy with the planter, and not regarded as a matter of consequence in general. So soon as the plants have attained a sufficient size for transplanting, they may be drawn from the bed and placed on the hills whenever there is moisture enough to prevent their dying. This is generally done after a shower; but should the land be very wet, it is best to wait until it dries or settles some, as the plant will do better set when the land is not too wet. The plant, if it survives the transplanting, will soon commence growing, and requires no attention until the weeds and grass begin to make their appearance, and must be subdued by the plow and hoe. Should the earth become hard about the plant, the hill should be lightly scraped. This will greatly promote the growth of the plant. When the plant becomes large enough, the bottom or plant leaves may be broken off. This is called pruning, and the land may then be deeply and thoroughly plowed, taking care not to injure the roots of the plant, and the plant hilled up by following with hoes, and throwing the loose soil around it. In land that has been kept clean, this may be the last plowing: the weeds and bushes may be kept down with the hoe, should any appear.

When the plant is large enough to top, the leaves nearest the ground are to be broken off and the bud taken out, leaving on the stalk the number designed for the plant. The number of leaves, as was remarked about the size of the hill, is much a matter of fancy; yet it has more to do in forming the future character of the tobacco than most planters seem apprised of. Experience has fully demonstrated that ten leaves are sufficient for a plant, and this is almost a universal practice among our best planters. The first plants, if the crop has grown off unevenly, may be placed to twelve leaves; the next topping may be ten, and as the season advances, the number may be lessened, as the appearance of the crops and season indicates. This will insure more uniformity in maturing of the crop, saves much labor, and adds to the value of the crop, making it more uniform in quality. At this stage of the crop the care and attention of the planter is almost constantly required to keep off the worms and other insects which prey upon it, and in breaking off the suckers which soon appear upon the stalk at every leaf. Ample employment may be afforded to every idler about the premises.

As the plant approaches maturity, it begins to thicken, and assumes a stiff, slick and motley appearance, which the most unpracticed eye will readily detect. Should the weather be favorable (viz: dry), the first ripe plants may be permitted to remain standing until a sufficient quantity is matured to satisfy the planter in making a regular cutting. If, however, the weather be unpropitious, it is best to cut as fast as it matures, as it is subject to injury under such circumstances if suffered to remain too long. The harvesting of the crop is an important period in its cultivation, and neglect upon the part of the planter will bring loss in its future value. In cutting the plant, a sharp knife is to be used, and the stalk to be split about half its length, taking care not to break the leaves or otherwise injure them, and the plant to be set with the butt of the stalk up, exposed to the sun. So soon as the plant is wilted enough to handle without breaking, they should be taken up and laid in a heap of seven to nine in a place, being governed by their size, and hung as soon as possible to prevent being scorched by the sun. The after part of the day is best for cutting; there is less danger of getting the plant sunburnt. The sticks upon which the plants are hung are small pieces of timber four feet long, and of sufficient size to support the plants. These are taken to the barn on a cart or wagon after receiving the plants, or may be placed upon scaffolds in the fields, at the option of the planter. If the weather is fair, it is best to sun it, as it aids the curing, and adds to the strength and elasticity of the leaf after it is cured. Care should be taken not to place the sticks too close, if the weather be damp and warm, as there is danger of injuring the plant. After remaining on the scaffold a few days it becomes yellow, or assumes the color of a leaf in autumn; it must then be carried to the barn or curing house, and placed away, keeping the sticks far enough apart to secure a free circulation of air through them. If the weather is wet, it is best to take the plants to the house at once, and let the yellowing process take place in the house rather than risk the changes in the weather, as rain is always injurious to the plant after it is cut, and especially so after it becomes yellow.

The curing process is one of the most important in the future value of the crop, and too much care cannot be given it, a small neglect lessening the value of the crop seriously. If the weather is dry and the tobacco is not too much crowded in the house, the action of the atmosphere, assisted by a small portion of fire, will be sufficient to effect the object. If, however, the weather is warm and damp, the atmosphere will not aid very materially in curing the plant, and unless firing is resorted to, the plant is certain to be more or less injured. It is always safer, after a house is filled with green tobacco, to rely upon the action of the fire to a considerable extent. This should be small and slow at first, and continued so until the tobacco is clear of the moisture engendered by the fire, and then increased until the leaf is nearly cured. When this is the case, the fires should be suffered to go out, and the tobacco be suffered to come in case, or get soft again. The quality of the article will be improved by permitting it to come in case once or twice before it is thoroughly cured in stem and stalk. Dry and sound wood is best for firing. If the object of the planter is to make a piebald or fancy article, care should be taken never to permit the leaf to get very soft during the curing process; and to make a really fancy article, the tobacco must be thoroughly yellowed before, and cured entirely by fire. This particular description is, however, not more desirable or valuable to the consumer, as the essential properties of the plant are frequently destroyed by the action of the fire. As a general thing, it is better to cure the weed by a natural process of air and the action of the atmosphere; and where the planter is provided with a sufficient quantity of room to house the crop without crowding too close, the object can be attained without the aid of much fire, and the wood and danger of burning the crop saved, and in some markets increase the value of the crop.

Having now arrived at the time when it is supposed the planter has secured and cured the crop, we proceed to give some directions in its future management and preparation for market—remarking that many, after all their previous care and labor, lose its profits to a good extent by either a want of knowledge as to its management, or a carelessness which is inexcusable upon their part.

After the tobacco has been thoroughly cured in stem and stalk, it is then ready to commence stripping, or taking the leaves from the stalk. In this process the plant first passes through the hands of the most experienced laborer on the farm, who takes off the bad or injured leaves and ties them neatly in bundles of eight or ten. The plants that are thus culled are given to others who strip off the remaining leaves, and tie them in bands of six or eight leaves, wrapping tightly and neatly, with the tip of the leaf used as a tie, so as to form a head of one a half to two inches in length. Care should be had to make the bundles as uniform in size and color as possible, as it adds to the beauty of sample by which it is to be sold. When the day's work is done, let the tobacco, neatly pressed through the hands, be put in a winrow, as it is termed, viz: laid straight in a bulk or pile of sufficient length to hold the day or two day's work, and only the width of one bundle and one-half, reversing each course so as to have the heads of the bundles out. Here it may remain until stripping season is over or the crop stripped. The first good drying spell of weather after the stripping, get the smoothest and smallest sticks upon which the tobacco was hung and hang up the tobacco to dry, carefully shaking it out when hung, so as to secure a uniform drying. When the weather again becomes moist enough to bring the tobacco in case, take it down and carefully bulk it away as before directed, only taking more care to straighten the bundles and make the bulk much wider; this is done by lapping the bundles over each course, similar to shingling a roof, the bulker having his knees upon the bulk, carefully laying down the tobacco as it is straightened and handed to him. When the bulk is finished, weigh it down heavily with logs or some heavy weight. Care must be taken that the tobacco does not imbibe too much moisture, or get too high in case before it is bulked, as it will injure. So soon as the tobacco becomes soft enough to handle without breaking, it may be put in bulk, and should the stems break a little under the pressure of the bulker's knee, no material damage will be done, provided the leaf does not crumble. A little attention will soon teach the most ignorant the proper order for safe-keeping. The tobacco will be safe in bulk, and will wait the planter's convenience to prize it in hogsheads.

In prizing, the different qualities should not be mixed; and if the planter has been careful to keep them separated, no trouble will be had in assorting them when ready to prize. In packing in the hogsheads, care should be taken to have every bundle straight, and every leaf to its bundle. From a well packed hogshead any bundle may be drawn without injury or interruption to the others. The usual way of packing is to commence across the middle of the hogshead, placing the heads of the first course of bundles about eight or ten inches from the outer edge and running the course evenly across; the packer then places the bundles of the next course in the same direction, the heads against the side or edge of the hogshead, and follow the circumference until the heads of the two courses come in contact; after that course is completed, he finishes the other side by placing the heads against the cask as before, so as to have three courses across the cask, the bundles all laid in the same direction, and the next layer is reversed, carefully placing each bundle as it is thrown or handed to him. When filled, it is subjected to the press or screw and forced down.

Our hogsheads are from forty-four to forty-eight inches across the head, and fifty-eight inches in length, and from 1,800 to 2,000 pounds can be easily prized in them. If the tobacco is large, rich and oily, the harder it is pressed the better, and the better price it commands. These remarks are particularly applicable to those heavy descriptions of tobacco known in Virginia as heavy shipping leaf, and in the West as Clarksville tobacco, where the soil and climate are peculiarly adapted to the production of this description of tobacco. In climates not so well adapted and soil of a different character, the same variety of the weed will assume a different character, being of a finer or coarser texture, as the case may be, light and bulky, and destitute of oil and substance. Tobacco of this description should be managed as before directed, but prized lightly in the casks, so as to admit of a free and open leaf, such being mostly required for cigar leaf.

The writer has been a close observer of tobacco sales for several years, and has seen a difference of two to five dollars per cwt. produced in crops grown on adjoining farms, cultivated in the same manner, and sold on the same day. The buyer must take the tobacco as it comes from the planter's hand; he can only use a certain part of it per day. That in safe condition he can keep for future use, and is always willing to pay for it full market rates; that out of condition he must keep until he can use it; and, if he considers his interest, buys at what it will be worth to him when he shall be ready to work it up, thereby throwing on the planter the injury and loss in the tobacco from the time of purchase to that of manufacturing. This loss is considerable. The planter has to bear it; it is right that he should. He has no cause to complain of the manufacturer; if he feels like doing so, let him come here in September or October, and walk into one of our large factories, and take a look at a hogshead then being pulled up, bearing his own name on its head, which he sold in the spring. We presume he would then feel rather more sympathy than blame for the manufacturer, and congratulate himself that he and that tobacco parted long ago. But planters can remedy this evil. It is useless for them to talk about bad seasons for striking, bad winds, cold winds, too much or too little rain, &c. This will not exonerate them from the duty they owe themselves. These bad seasons are not universal; they do not affect every planter; when they do we shall believe them. There are planters who always manage their crops properly, in defiance of too much season, too little season, or any season at all. They are men of reputation as planters, and will do all they can to sustain it. Examine their crops year after year, and they will invariably be found in good condition, and will always bring the highest prices.

AUGUSTA, February 2, 1863.

DESCRIPTION OF THE PROCESS OF GROWING AND PREPARING FLAX IN WEST FLANDERS, IN PARTICULAR, THE WHITE FLAX, ON THE LYS, NEAR COURTRAI.

From a Belgian Public Document.

In most parts of the kingdom of Belgium the culture of flax is considered one of the principal resources of the farmer. But the section around Courtrai is perhaps *the* country which presents, in regard to the culture of flax, many things that may be worthy of imitation elsewhere. There the culture of flax is carried on most extensively, and the greatest portion of the flax grown in West Flanders and Hainault is sold into this region in a raw state and there prepared, except that intended for cambric, which is exported to France.

At first, this vast importation and production of flax may have been caused by the peculiar property of the water of the Lys for the rotting of flax; but now the same is furthered by a large amount of capital invested in the flax trade by business men of this region. The best flax is found in the environs of Doornik; it is of an inferior quality in the neighborhood of Courtrai, and of a still more inferior quality in the northern part of the province.

1. Soil.—The soil of West Flanders is very different in respect to fertility. In the region around Courtrai, in the direction toward Meenen, there is found a heavy loam soil with a substratum of fine white or yellow sand. In the section around Rousselaere, Ypern, etc., the soil is more mixed with sand, and around Bruegge, Coukelaere and Thourhout, there is found, for the most part, a dry, barren sand soil rarely intermixed with loam. The substratum of the upper crust is likewise sand, of a white or yellow color, here and there also of alluvial earth or potter's earth. In the immediate neighborhood of Doornik there is a rich, solid loam soil, partly also clay soil, with a substratum of yellow loam or sand. The upper crust is either of a mixed blackish and bluish, or whitish gray col-

or, according to the effects of manure and culture. The land is mostly level; even the most severe drouth will not dry out the soil to a greater depth than three to four inches from the surface. A careful cultivation has given the soil a very deep upper stratum of fertile ground.

However different the soil may be, yet excellent flax is grown everywhere, with the exception of the quite barren sand soil, the cold clay soil, and the ferruginous soil. But the best and finest flax is found on the solid, rich loam or clay soil, in the vicinity of Doornik; flax of a middle quality in the neighborhood of Courtrai; but on the sand soil in section around Bruegge, etc., an inferior, coarser and harder article is grown.

2. Preceding Crop.—In West Flanders, potatoes, oats, hemp or succory, generally, are the crops chosen to precede flax; less frequently rye, wheat and clover, the latter only on cold soil, but never on warm soil, because it is contended that flax following after clover would burn out in a dry season. Hemp and succory are believed to be the most suitable crops to precede flax; the latter especially the early flax. In general, the rule prevails that oily plants, with the exception of hemp, are not suitable crops to precede flax, while mealy products, except beans and peas, are deemed suitable for that purpose. Flax is grown but once on the same field in seven or nine years; even in a good, unexhausted soil a good flax crop is not expected again on the same field sooner than seven years after the preceding flax crop.

3. Cultivation and Manuring.—The cultivation of the field varies according to the nature of the soil and the preceding crop. Where flax is to follow upon potatoes, the field is plowed in the fall into small beds, and plowed or spaded deep in the spring. Oats, rye and wheat fields are plowed shallow once or twice in the fall (a wet soil is plowed deeper), laid into small beds, and plowed deep again in the spring. The cultivation of the fields where succory has been raised is different. If the soil is low, the succory is taken up late in the fall, the field laid into small beds, and plowed or spaded deep in the spring. If the soil is higher and drier, then the succory remains in the ground until spring. In spading it out the field is worked up deep, and is thus prepared simultaneously for the reception of the flax seed. Hemp land remains untouched through the winter, and is plowed deep in the spring. In Hainault and the vicinity of Courtrai, where seeding is done very early, the

land is laid into small beds, six to eight feet wide, with furrows one to one and a half feet deep, in the fall.

On a cold soil, straw manure from cattle is plowed under, in the fall. This is deemed proper, because then the soil remains loose, penetrable to moisture, and may be sown earlier, especially if it was laid into small beds. In the neighborhood of Bruegge, Thourhout, etc., where much flax seed is sown in a generally dry soil, in May, much liquid manure is hauled on the land, in the winter or shortly before seeding. In cultivating as well as in manuring, the site and condition of the field and the yet unexhausted power of the old manure are taken into consideration. A naturally strong soil and a field in which there is much old manure, is not manured for the flax crops, because otherwise a long, but coarse and inferior article would be raised. To grow flax on poor land, even if fertilized by straw manure, will not give satisfaction, because flax requires the power derived from the old manure yet remaining in the soil. The Belgian flax-grower, therefore, endeavors always to use such manure for flax as will soon take effect, and mostly applies liquid manure. In order to obtain a good supply of this, the Belgians have their cattle stalls paved, so that the urine is drained into reservoirs constructed either beside or below the stalls. The solid excrements are also shoveled into these reservoirs, and besides, the stalls are rinsed with water twice or thrice a day. If this supply of liquid manure is yet insufficient, rape cakes are dissolved in water, and human excrements are added besides. But no water from human excrements, and only such as has received a weak solution of rape cake, is brought upon a warm soil, because otherwise the flax will be burned upon the halm, in warm and dry weather. Thus, if withered halms are found in the flax, in dry summers, they are most numerous where the field has been manured with liquid manure mixed with a solution of rape cake and other ingredients. In wet weather, flax in such ground will fall down. On poor, sandy soil a greater quantity of rape cake may be used. The rape cakes are broken to pieces and the dissolution is to take place only two or three days before being brought upon the land ; an earlier solution, so that a fermentation takes place in the reservoir, is deemed injurious. Dry rape cakes pounded into meal and strewed upon the field likewise have a good effect. Ashes are very good, but wood ashes are preferable to coal ashes. Hemp and poppy cakes are likewise used as manure ; but linseed cakes are deemed very injurious on flax fields.

4. Seed and Seeding Time.—Good Riga seed is highly valued in Belgium, and although the farmers, in some sections, raise their own seed, yet at most places they use partly foreign seed, regarding such as stock seed, in order to raise from it good seed crops, and besides they use it especially for early seeding. The first seed crops from Riga seed is called *rose-seed*, and this is deemed most excellent, and sometimes better than the Riga seed itself, because it produces a fine and flexible article, and is said to yield more flax. The seed grown next still yields a satisfactory crop ; but after that a change has to be made again. This is done partly by bringing seed grown upon an inferior, poorer soil, into a more powerful and richer one. A change of linseed from eastern to western sections is believed to be advantageous, but not *vice versa*. A just suspicion prevails in Belgium that much deception is practiced in the trade with Riga seed, by selling Sealand seed for Riga seed. The price per ton, 34 to 36 francs, for pretended Riga seed would seem to be a good reason for this suspicion, since in Westphalia the ton costs 14 to 16 Reichstaler. A criterion of the Riga seed is, that the grains are very pointed, and that there is some seed of weeds amongst it. As to the quantity of seed, three tons of Riga seed are calculated for about five Russian acres.

The seed crop is considerable in Belgium, since the drying of the flax before working it in any other way, of which we shall treat hereafter, furthers the ripening of the seed, so that generally the whole of it attains its perfect germinating power.

Seeding is done in Belgium as early as possible. If the weather and the natural condition of the soil admit, seeding begins as early as the middle of March. On cold, wet soil, the seed is sown somewhat later ; but at beginning of May seeding is done everywhere. In order to seed so early, the field is laid into small beds by deep furrows in the fall, because in this way the water flows off the more readily during the winter, the field dries off sooner, and thus is better prepared for an earlier reception of the seed.

Early seeding has the following advantages :

The plant is less exposed to the devastations by the spring-tail, (insect.)

The young plant does not suffer from a severe drouth, and grows thriftily, by an increasing warmth in summer.

The flax grows stronger, and does not fall so easily.

A finer and more uniform crop.

A larger yield.

The early flax, in growing up more slowly, gets a strong, durable fibre, while the late flax, growing up more rapidly, obtains a weak, soft fibre, less capable of enduring the process of preparation, whereby a considerable loss in weight is caused.

In order to obtain a uniform, fine plant, the Belgian flax-grower takes care that the field is uniformly manured with the above described manures, and that the seeding is done properly and uniformly. Flax sown too thin will have thick halms, and be of a coarser and inferior quality ; not sown uniformly, the flax will be partly fine and partly coarse, and must be sorted, which requires much time ; sown too densely, the yield will not be satisfactory, the flax remaining short.

5. Weeding. When the flax has grown to the height of two or three inches, the weeds are to be destroyed. Women, girls and children, move on their knees through the flax, and carefully pull out the weeds. It is done generally against the wind, in order that the plants thus pressed down may be raised again. If later (when the flax is seven to ten inches high,) and weeds should appear again, the weeding is to be repeated.

6. Signs of Ripeness—Gathering and Drying. In Belgium there are various rules in regard to the time when the flax must be pulled ; but it is not to be presumed that it must be pulled in this or that state of ripeness, because, in this respect, everything depends on the growth of the flax plant. In general, the flax is suffered to get riper in the vicinity of Courtrai than in the neighborhood of Doornik and St. Amand, where flax is grown mostly for cambric weaving, especially in the sections around Bruegge, Thourhout, Cankelaere, Roulers, etc., where it is the chief aim to raise a good seed, the flax is suffered to stand longer.

The common signs of the ripeness of flax are as follows : When the leaves from below, for half the length of the stalk, are fallen off ; when the color of the halms turns from greenish to yellowish ; when the seeds are no longer milky, and the seed-capsulas become yellow and hard. But this period is not waited for, if in a good flax crop there appear red halms soon after blossoming, or if the flax lies down. As to such flax as has suffered from rust or other casualties, and, therefore, is of but little value commercially, the chief aim is to obtain good seed from it ; and if there is a fair prospect for this, the flax is left on the field until the seed has ripened perfectly. A good crop is left standing as long as there appear no dead and dry halms, in order to obtain as good a crop as possible; but as soon as some of the halms begin to die off, pulling is commenced at once.

After pulling, the better flax is put up on the field to dry. This is necessary, because the supply of water for rotting the flax in a green state would prove insufficient for the vast quantity grown there. The rotting-pits in the northern provinces are scarcely sufficient to rot the inferior sorts in a green state, and to transport the flax in a green state from various sections a distance of ten hours travel to the Lys, would be impracticable, because it would be heated; besides the Lys could not obtain the immense quantity of flax, if it were not properly distributed along its course, during the summer.

Since the same field often will produce an article varying in length and quality, it is carefully assorted while being pulled, and great care is taken lest the good and long article becomes mixed with the short or such flax as contains red halms, which are to be removed very carefully. Such assorting is very important, for flax of different qualities and strength will not rot uniformly, and red halms in it deteriorate its value considerably.

The pulling of the flax is done in Belgium in the same manner as in other countries where flax is grown, but proper care is taken that the halms be laid even. On account of the greater weight of the seed ends, sometimes the flax gets entangled, which is remedied by taking hold of the root ends and shaking it till it has its proper shape again. As the flax must not become wet while it lies upon the ground after pulling, it is put up in shocks generally on the same day. In putting them up, three persons always work together, two of whom carry the flax, and the third puts it up in shocks, by means of a spade stuck in the ground, against which the flax is leaned. Proper care is to be taken that the halms remain in a smooth, even position. The shocks are put up to a length of six to eight feet, and consist of forty-five to sixty handfuls of flax. Whenever a shock is done, some halms are drawn out at the ends, and the upper parts of the shock are tied together with them, lest they fall down. The shocks are put up so as to have the opening towards the north-west and south-west, in order that both sides be exposed to the rays of the sun. In these shocks the flax remains standing until the inner halms, being less exposed to the sun, have dried out to such a degree as will cause the wooden particles to part readily by means of friction. During long continued rainy weather, these shocks have to be transposed, but this is done no sooner than when it may be apprehended that the inside may be attacked by the so-called night-rust and putrefaction. The length of time during which the flax remains in these shocks depends upon the state of the weather. In favorable weather it is confined from four to six or eight days, while in rainy weather often several weeks are required. When the flax is dry enough, it is bound up, in which operation it is freed from the dry leaves yet remaining and the earth adhering to it, by being knocked against the knee; one shock will make four to six bundles. In order that the seed and halms may dry yet more, these bundles are laid upon poles, and these upon stones, to keep the flax off the ground. In laying these stacks the bundles are put alternately upon each other with root and seed ends, so that the root ends project over the seed ends, in order that the seed capsulas may be protected from the rain. These stacks are put up to a height of seven to eight feet, with the open ends pointing in the same direction as the shocks. At last, bundles are laid lengthwise on the east side, whereupon still another layer is put with the seed ends toward the east, whereby a slope toward the west is made. For further protection against rain, a layer of straw, two to three inches thick, is put on the top, projecting on both sides. To keep down the straw, poles are laid over it, which are tied fast to poles dug in the ground.

The drying of the flax, which becomes necessary on account of the requisite rotting-water not being at hand everywhere in sufficient quantity, has its advantages as well as disadvantages. The greatest advantage consists in getting a seed which is perfectly ripe. In favorable weather, the disadvantage consists in a loss in weight and flexibility. This disadvantage may be lessened, by rotting the flax in the same manner as is done in the neighborhood of Lokeren, where the people try to give the flax a blue color. In unfavorable weather, the inside halms are much subject to night-rust, or even putrefy, or become black at the ends. In such cases, the flax has to be transposed oftener, from one place to another, which causes much labor, and yet it does not arrest the evil entirely.

7. The Beating off and Preservation of the Seed. After the flax in the stacks has become perfectly dry, it is stowed away in

the barn; of that portion which shall rot yet in the same fall, the seed is beaten off immediately; but that portion, which is not to be put up to rot before the ensuing spring, is laid away, like grain, and the seed is beaten off in the winter. For beating off the seed the flax is laid upon a smooth barn floor, three to four inches high, in two rows, with the seed ends against each other, but no closer than that the seed ends of both rows merely touch each other. Only the tops, as far as the seed-capsulas or knots go, are beaten with a light unnotched wooden hammer. When there are no more capsulas at the upper side, the rows are turned over, as in thrashing grain. After the seed is beaten off, the flax is tied, with straw bands, into bundles of about one foot in diameter, and then taken away to the rotting-place.

The beaten-off seed, with its chaff, is put upon an airy garret. If, for want of room, it is put into barrels, a stick is stuck into it upright to prevent its becoming compressed, and to further evaporation; and sometimes it is put from one barrel into another. The next cleaning of the seed is often done there with the fanning mill, in which operation much seed falls into the chaff. As the dry seed capsulas are completely beaten to pieces, fanning upon the barn floor would answer this purpose much better, because the better seed might thereby be separated from the inferior; but for this the farm buildings in Belgium are not suitable. If the seed is not to be used in the first year, it is left lying with the chaff whereby the germinating power of the inferior grains is said to increase still more. The seed capsulas soaked in hot water are good food for cattle.

8. Rotting in the Lys. In West Flanders, first in the vicinity of Courtrai, the people have, more than twenty years ago, begun to rot their flax in the Lys, on account of the scarcity of water generally prevailing there, for at many places the water is hardly sufficient for washing and for the cattle to drink. When the experiments with rotting in the Lys were crowned with eminent success, flax commenced being brought thither from the most remote localities. The villages and towns on the Lys—Wevelghem being the principal one—commenced purchasing flax, yet in the field, in more remote sections, to rot in the Lys; and after that, they cleaned it and brought it into the market, so that many establishments were formed there whose business consisted in the preparation of flax. The drying of the flax as done there, facilitates that

process, since the flax could not stand being transported so far, while yet green. Moreover, the water of the Lys is said to be less suitable for rotting the flax in its green state.

The Lys is navigable on French territory; it forms the border from Armentieres to Meenen, enters Belgium entirely below Meenen, and is distinguished for its slow and uniform current and clear water. Rotting may be done there during the whole summer, without apprehension that the water may be turbid by freshets, or that freshets may occur. The rotting time commences there in the middle of May and lasts to the end of October. As much as three or four weeks before this time, the people begin to transport flax thither, and lay it in heaps, until the water has attained a necessary clearness and warmth. The rotting is done in boxes or lath partitions, of 12 to 15 feet in length, 10 to 12 feet in width, and 3 feet in height. A rail frame, strong enough to nail the laths to it, forms the bottom of the box; the laths are fastened 4 inches apart from each other. The side walls are formed also of laths, and the fourth side or wall of the same is not closed before the flax is put in. Several days before being put in the boxes, the flax heaps are taken apart, and the water-bundles are made. In making these bundles, the flax is assorted again, separately, the shorter from the longer, and laying apart that which is thought to require rotting longer than usually. Dust and leaves are carefully shaken off. The water-bundles, from 9 to 12 inches in diameter, in which head and root ends are yet put together alternately by the handful, are tied with three straw ropes. In putting in the flax, one man stands in the box, and puts the bundles in upright, close to each other, so that 180 to 200 bundles go in every box, whose bottom and sides are covered with a thin layer of straw beforehand. This layer of straw, and a close packing of the flax, are necessary, lest the water flow through too fast, and some slime from the outside may penetrate between the flax. It is necessary to prohibit the sudden removal of the gum particles of the flax, whereby the fermentation is rendered more uniform and complete. When the box is filled, it is launched from the poles on which it rested hitherto, and drawn, by means of a rope, to the place of its destination, at the shore, and there fastened; the opening at the top is then covered with straw, and boards over this, and burdened with stones, but the water must not flow over the box. Afterwards, when the box begins to sink in consequence of increased fermentation, some of the stones are taken of. If this should be neglected, the box would sink to the bottom, which has happened in some instances. If several boxes are put in simultaneously, the upper one is nailed shut with boards at the side facing the current; then the other boxes are drawn up as closely as possible against the first in a row, all of which is done to lessen the streaming of the water through the flax.

In rotting flax, it must be considered, whether the flax is fine or coarse, weak or strong, and whether dry or wet weather prevailed while it was growing, and even the weather during the rotting time is to be considered. In dry weather the fermentation is finished generally in 6 to 14 days; a complete rotting is very seldom done between the 3d and 6th day. The more the rotting box sinks, the nearer approaches the end of fermentation. The signs of it being sufficiently rotted, are as follows:

1. When the woody stock has become brittle and fragile, so that it breaks like glass, with a peculiar sound; when bent, on the contrary, if the halms may be wound around the finger without breaking, the rotting is not yet completed.

2. When, in breaking off the root of a halm, the base is loose around it, and the woody stalk may be drawn out, as out of a sheath.

3. When the drawn off bark or fibre coils together, or when a wet stock, wrapt together and thrown into the water, sinks.

It appears that flax taken out of the water is not yet rotten enough, the same is put upright on the shore, as close to the water as possible, and remains standing there for 12, 24, or 36 hours to rot more. In this case, the flax is covered with straw to protect it from the rays of the sun, which injures the color. In taking the flax out of the rot, many submerge it several times in water to clean it; others do not deem this advisable. The rot being finished, the flax immediately is put up in trusses, called chapels, to dry. As soon as the outside is dry, the chapels are turned so that the inside comes outside. When dry, the chapels are bound together, two and two, then the flax is hauled home, or put up in shocks, until it is laid down for bleaching. If it should appear afterwards that the first rot has not had the desired effect, a second rot is resorted to, several weeks later, or in the next spring. By a second water rotting, which limits the bleaching or dew rotting, the flax is said to gain in weight and flexibility.

9. Bleaching. To complete the rot, as well as to gain a better color, the flax is bleached after the water rotting. The bleaching during the months of March, April and May, is called spring bleaching; during the months of June, July and August, summer bleaching; and during September and October, fall bleaching. The flax bleached in March becomes very white, and is easily cleaned of the shavings, but is said to remain hard. Flax bleached in May receives, from the effects of the dew, especially on meadows, a flexible handle, as it is called, great weight, and a nice, bright color. This flax is the most esteemed. Flax laid upon newly mowed meadows to bleach gets a yellowish color, and is said to lose in weight. Fall bleaching, so often affected with the injurious night rust, is used only for inferior flax, or by poor people, who try to dispose of their flax in the first year. To prevent the flax from becoming too white, some let it bleach no longer than 2 to 3 days. This is called the minute bleaching, but it is as yet but little in use, since the linen woven of such flax is hard to bleach. For bleaching, wet and cool meadows, covered with long grass, are most suitable, for there the bleaching proceeds more regularly. On dry meadows, especially where cattle have pastured, there is generally more vermin which damage the flax to a greater or less extent. On meadows with long grass, the flax will suffer less from rain and hail. To secure a good bleaching, it is required that the flax be laid carefully and evenly, the halms adhering together should be loosened, and the whole be turned frequently. When the upper side has the desired color, then the flax is turned, and remains lying until the color of the other side is satisfactory also. After a hard rain, having beaten down the flax too deep into the grass, it must be turned without delay. When two or three sunny days occurred during bleaching, the flax has to be turned even after a light rain. In continuous rainy weather, the flax must be turned and shaken up every two or three days. If such weather sets in toward the end of the bleaching time, the flax must be turned every other day, otherwise the night-rust will affect it. The night-rust consists of gray spots, it first appears on individual halms, but will increase within 24 hours to such extent that all the flax assumes a grey color. It mostly occurs during the fall bleaching, and chiefly:

1. When the flax lies too long and too deep in the grass.
2. When it has not rotted enough.

3. When rainy weather continues several days, especially towards the end of the bleaching time.

4. When a very hot day is followed by a heavy dew.

5. When the earth evaporates strongly, especially when the air is yet unusually warm and sultry during the fog.

6. After a warm rain.

As soon as night-rust is discovered, the flax must be taken up and put into chapels; if it were left lying longer, it would be very detrimental, since the night-rust gives the flax a grayish-blue color, and greatly diminishes its strength. If, after bleaching is finished, the flax cannot be brought into the barn, on account of rain, it is advisable to put it up in chapels. Bleaching is considered finished when there are no more reddish-yellow halms, when the stalks are bent, and when the fibre or bast gets loose for about four to six inches in the middle of the stalk, and generally is easily separated from the wood. When this period has arrived, the flax is, in favorable weather, put up into chapels yet for several days; but, if rain is imminent, it is hauled home without delay.

Bleaching requires twenty to thirty days; seldom is it well finished between ten and twenty days. The weather and the nature of the flax determine this. In favorable weather,—namely, when sunshine and a little rain follow alternately—the flax is turned twice and shaken up twice every five to seven days; stands after that in chapels for two to three days, and then bleaching is done. In less favorable weather, the bleaching time lasts longer, and labor is multiplied. In binding up, after bleaching, the flax is assorted again; that portion which has not the desirable color, but is either blackish-gray or reddish, is bound up by itself alone. The bundles are made to the size of one foot in diameter.

Here it is deemed a matter of importance that flax, grown and dried in one year, should rot the next spring, the next spring after that be bleached, and be further prepared in the ensuing winter. In this way the flax is brought into the market no sooner than the third year; but it is asserted generally that letting the flax lie so much longer improves it to such a degree as to amply cover the amount of interest.

10. Breaking and Swingling. After the flax has been properly bleached, it is cleaned according to time and circumstances, which is done by breaking and swingling. For this work wet weather

is awaited, if possible, and it is done in localities situate at moist places.

The breaking is done on a smooth, level floor, where the flax is spread according to its toughness. The breaking-hammer consists of a piece of hard wood one foot long, six inches wide, and five inches high. The lower sides have seven notches, one to one and a half inches deep. The upper corners are rounded off a little. The handle is three feet long and curved. The laborer first steps upon the head ends of the flax, and beats first the root ends, moving forward his foot as he advances with the hammer to keep the beaten flax in its smooth position. When the upper side of the layer is sufficiently crushed by its continual beating, the flax is turned over, and the beating proceeds again in the same way. After the breaking is done, the laborer steps with both feet crossways upon the flax, near the root end, seizes the beaten off roots, and separates them from the stalks, lest they impede swingling; then he seizes the flax at the top ends, thrusts it once or twice down upon the floor to make the root ends smooth and straight again, whereupon the swingle is put into requisition.

In swingling the laborer divides the mass in such parts as he can comfortably hold in his left hand, parts this handful, and pulls out at the foot end, adding the best of the pulled out halms to the handful again, thrusts them twice or thrice upon the ground to make it even, seizes it firmly with the left hand two or three hands' breadths from the root end, lays it against his left thigh, and breaks it with the right hand near the left. Then the handful is laid in the incision of the swingle board, and rubbed at various places, so that it hangs down close to the swingle-board. The better the flax is rubbed down at the swingle-board, the less the foot ends will be knocked off. After this the flax is laid in the incision of the swingle-board, so that one-third of its length comes under the stroke, but the other two-thirds hang down at the back side of the board. Now the laborer seizes the swingle-staff, and beats the part brought under the stroke; at every stroke he brings a little more of the part hanging down at the back side under the stroke, until half the handful is under the stroke, strikes yet several times upon the whole, turns the lower side up, and repeats the same operation. As circumstances may require, it is turned and beaten twice or thrice. Then the whole handful is taken out of the swingle-board, is made smooth and even with the right hand against the left thigh, and the protruding halms pulled out, the longer ones of which being added again to the mass. Now the flax is seized at the foot end with the left hand, and held upon the head of the swingle-board, so that the head ends hang down in front of the same. The unswingled head is parted with the right, and the protruding halms pulled out, of which the better ones are added again to the mass, which then is brought into the incision of the swingle-board, and swingled in the same manner as the foot ends. After the head ends also have been beaten enough for the first time and pulled smooth again, the inside is turned outside, which is done in the following manner: the laborer takes the foot end of the flax under the left arm, bends down a little, puts the left foot upon a stone lying beside him, opens the mass at the upper end by parting it carefully with both hands up to the middle, turns thus the inside outside, seizes the flax with the left hand at the head end, and runs the right hand through it to the foot end in order that this also be opened. Then the mass is laid again in the incision of the swingle-board, is swingled through with a sharper swingle-staff several times, and then laid aside. When a second handful has gone through the same operation, then both are taken together, and considered *one* handful, which is again brought in the incision of the swingle-board, but so that only one-fourth of its length comes under the stroke, and the other three-fourths hang down at the back side of the swingle-board. Now it is beaten vigorously with the sharp staff, and at every blow the mass is lowered a little until half the length is under the stroke. The flax is turned repeatedly during the operation. After the foot end has been beaten smooth in this way, the head end is brought under the stroke, and when this is also smooth, the inside is turned out as before; and this operation is continued until the whole mass is free of all stems. If this cannot fully be done with the sharp swingle-staff, scraping with a dull knife must do the rest. The swingler ought not to deal his strokes quite perpendicularly, but a little to the right side; and in striking touch the projecting head of the swingle-board with the lower outside edge of the swingle-staff; hold the swingle staff not too tight; deal his strokes powerfully and accurately; turn the flax often, and the inside out; pull out the protruding parts well and often; pick up often and lay aside the tow; not take too large handfuls; and keep the flax as even as possible at the foot end.

The swingle-board is a board of hard wood—pear tree, apple tree, beach—four feet high, fourteen to sixteen inches broad, and one and a half inches thick.

The incision is made about three feet above the block, according to the size of the swingler, and is two and one-fourth to two and one-half inches wide, and nine inches long. Below the incision, the board is rounded off a little. In front the board is sharp, in order that the flax may be brought into it without trouble. The rounding (breast) is made for the purpose of bringing the flax with the left hand more easily and better under the stroke of the swingle-staff. The swingle-board is fastened upright in a block, two to three inches thick, in such a position as to lean, from the edge of the incision, one and a half inches off from the swingler, and incline one and a half inches to the left side, which inclination is still to be increased, if the swingler cuts off the head of the flax. On either side before the foot, two poles are driven into the ground, projecting one and a half feet, and connected by a strong leather strap, which not only protects the laborer from injuries by the swingle-staff, but also facilitates the work, as the staff in falling on the tightly stretched strap will rebound forcibly.

ON THE BREEDING OF HORSES.

The following valuable article was prepared by Colonel H. L. Shields, at the request of the managers of the Rensselaer County Agricultural Society:

In most dissertations upon this useful and indispensable animal, much space is devoted to describing the origin of the horse—the differences between the Darby and the Godolphin Arabian; how they were obtained, &c., &c., subjects which, in our judgment, but little interest the breeder of the present day. We propose, therefore, briefly, to allude to those points in breeding, breaking, training, driving, and the general management of the horse, as shall equally interest all who, either for business or pleasure, use this noble brute. Many of our farmers who yearly raise one or more colts, pay no attention whatever to the size, action, &c., of the mares or stallions they make use of; and many men of business and pleasure who keep horses, knowing nothing of how their animals should be fed, groomed, driven and managed, leave all of these important considerations to the care and judgment of bipeds as ignorant as the brute himself, and far more unfeeling, thus causing heavy losses to owners from their own carelessness or ignorance. It will therefore be our aim to give in a brief space such hints as shall remedy this evil, to all those who will take the pains to peruse this article and remember the contents. First, then, as to

Breeding. Under this head it is well to consider the use for which the animal is designed—whether for the road, the coach, the course or heavy draft. No animal is fitted for all these various purposes.

It is desirable that all horses should be of good color, dark bay, chestnut or brown, (with as few white marks as possible,) these colors being best, and indicating more constitution than the lighter colors. Small, lean heads; full eyes; long, tapering necks; sharp, deep shoulders, sloping well back, (for heavy draft some prefer the upright shoulders;) large in girth; broad loins; sinewy, flat legs, short from knee and hock to the foot; round, (barrel;) dark good sized feet are elements of beauty and usefulness to which none can object.

For the Road. A horse should be about 15 hands high, (a hand being four inches,) measured from the top of the withers or shoulders to the ground, when the horse stands naturally. His weight should be about 1,000 pounds, for such weight in an animal 15 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, pound their feet less on pavements and hard roads, and are apt to be more fleet than those of a larger class; for while greater length and height 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 racers and trotters have generally been from this class—Eclipse and Fashion, Ethan Allen and Flora Temple, for example; such, then, are the horses for road, saddle or turf.

The *coach or family horse* should be of larger class—say 15½ to 16½ hands high, and weigh from 1,000 to 1,200 pounds. Such animals, when combining style and beauty, command good, remunerating prices, and it is very questionable if they are not far more profitable to the breeder than the fleeter animals, which require much time for training to acquire the speed necessary to command high prices. The coach horse requires only gentle and perfect breaking—such as the farmer can give while performing his farm work—to command from $500 to $2,000 the pair. To bring a like sum the road horse must show great speed—such as not one out of fifty attains, even after years of training; and if time is money, that consumed in training the trotter must be added to his cost. To insure style, ease of action, intelligence and beauty, the coach horse should have a good strain of the *thorough-bred,* (animals with pedigrees tracing back to the English turf on part of sire and dam, although a term constantly misapplied when speaking of Morgans, Black Hawks, &c.,) and yet retaining enough of the cold blood to give him the heavy tail, mane, &c., never possessed by the thorough-bred horse. Our remarks about color and figure are all-important in the coach horse.

The *draft horse* should be from 15 to 17 hands, and weigh from 1,200 to 1,500 pounds, with short legs, broad, short back, loins and chest, round, solid body, and capable of throwing great weight into the collar, of quiet, easy disposition, rather resembling the patient ox than the restless, nervous thorough-bred.

These three breeds are distinct, and as well might we expect the grey-hound, the St. Bernard and the terrier, each, to show the peculiarities of the others' separate natures, as to expect the racer to draw a heavy load of stone, or the clumsy draft horse to show 2.40 to a sulky; and yet such has been the unreasonable expectation of many American farmers and breeders.

We will close our remarks on breeding by describing our model of the brood mares and stallions. Both should be of good color and temper, their ancestry possessing for two generations the same good qualities, if possible—for animals often breed back to a white-faced, white-legged sire or grandsire, dam or granddam. There should be a *moderate proportion* of size maintained, the mare being rather the larger; but the great mistake of breeding a small mare to a very large stallion, and *vice versa,* will probably produce a monstrosity of a quadruped with the large head of one parent and the small body of the other. A reasonable proportion can rarely be realized. That by a judicious system of breeding, horses can be brought to a larger or smaller size, none can doubt; but it should be done in a series of generations, never in one. The same remarks apply equally to gait. Cross a short, quick-stepping Morgan with a long-gaited thorough-bred, and you produce often a mongrel that has a medium length of step and no quickness. If like produces like in any point it should be in gait; but both parents should be gaited alike, never *extremely* dissimilar in this or any other respect. Shorten and quicken, or lengthen by degrees, in three, four or more generations. Especially should both parents be alike in points desirable to retain in the offspring. A brood mare should be roomy, and a *good milker* (for no foal can flourish where the dam gives it no food;) both sire and dam should be between eight and thirteen years old. If parents are older, their colts are puny looking animals. Neither should they be over-worked. Hard training essentially impairs the powers of breeding, and hence so few of our renowned horses have left worthy successors. The mare should be kept steadily at breeding to develop her qualities as a dam. First colts are rarely the equals of their successors.

Great mistakes are also often made by our farmers in selection of stallions. To save a few dollars for the services of the horse, they often breed to any inferior animal that presents himself, forgetting entirely that the colt from good stock will remunerate him fourfold for the extra cost of service; after which the expense for rearing a superior and an inferior colt is the same, and while one at five years old commands $500, the other will find slow sale at $125. In our judgment stallions should be selected by properly appointed judges, and no others be allowed to serve mares. Two or three first-class stallions, of proper size, pedigree and action, in each county, would rapidly improve our stock, and would also remunerate their owners for the large outlay necessary to obtain them. In this respect Kentucky is fast outstripping Vermont, while the latter State has every advantage in its clear, cool, invigorating atmosphere, its sweet mountain herbage, while the rough ground over which the colt climbs in pursuit of food, develops every muscle, and gives him feet like flint and sinews of iron. In New York and Vermont, *thorough-bred* stallions of large size are needed to bring up gradually the size, courage and endurance of horses. To prove good stock getters, stallions should be spared from the severe training necessary to develop speed. If of good ancestry and the necessary form, there can be little doubt of the animal's performance if trained. Hard driving takes from him the courage, fire and vigor which should mark the stallion, and even if a little vicious withal, it is no *material* objection in the sire. Very *amiable* horses rarely possess strong constitutions, while the vicious brute is always tough and hardy. Our stallions are often worked to earn their *living*, or trained to trot fast, as such animals only pay in the stud—many presuming that such must necessarily get trotters, while they forget that all the powers of the constitution are taxed to sustain the unmerciful driving to develop speed. The *figure* of the stallion should be closely inspected—short necks, big heads, light limbs, white face and feet, narrow loins, ring-bones, curbs, spavins, &c., &c., are all *inheritable*. We yet hope to see the day when stallions will be owned by Agricultural Societies and used for the public good, thus avoiding the miserable degenerate race now infesting the country, and the extravagant prices demanded for the services of the few that are worthy.

Treatment of Colts. In the foregoing we gave some general principles of breeding. It is our purpose now to speak of the training and general management of horses. Farmers are apt to go to one of two extremes with their colts—either to halter them and drag them about through the heat of summer, on roads of all kinds, alongside their dams at work, or else to turn them out to run wild during the first six months of their existence, out of sight and hearing of human beings. Now, we take exception to both these methods of proceeding; to the first, because the limbs and feet of the young animal are tender, and apt to be strained and bruised by being compelled to keep up with the dam, even when walking, for several consecutive miles. The young colt requires frequent rest, and should be at liberty to lie down whenever inclination prompts. When the colt becomes tired it drags on its halter, straining the cords of the neck, back and legs. It is also disadvantageous to allow the young animal to run too long without subjection, for when the attempt is made he will resist with great force and often with injury. At the risk, then, of some extra work, we advise that the colt be accustomed to be handled often, until he has no fear to approach persons, and when they always receive caresses, they are very ready to do so. At two months old, put on the halter; but allow the colt to go very much as he likes, occasionally drawing him towards you and caressing him. In two hours you will have imperceptibly broken him to lead. Then, when you tie him, do so with a halter he cannot break—a short struggle will satisfy him he is conquered. Never suffer any one to strike or yell at a colt; one such barbarous act will cause a day's work to overcome its bad effect. When first cleaning him, avoid the head—then approach that part tenderly, and if he resists go to some other point. In a few moments return, and so continue till he submits with pleasure, rather, to being handled and rubbed anywhere and on any part. Your colt is then half broken. Wean the colt at five or six months old, first teaching him while suckling the mare to eat oats. When taken from the dam confine the colt closely, and put them out of hearing of each other for one week. During the *first* winter, feed daily two quarts of oats and all the hay the colt will eat. This with good warm shelter will keep him growing and improving. Don't turn out in spring till the weather is settled and warm, and a full bite of grass. The first year makes or ruins the colt. It is the most important of his life. Keep him *fat* the *first* year, whatever you do afterwards, for this year decides whether he is to be a full grown horse or a miserable pony—no after care can atone for neglect during the *first* twelve months. Good pasture (mountain if possible) the next season and plenty of hay the next winter, with a quart of grain if convenient, will bring you a finely formed, powerful two year old. If a horse, alter him early *before fly time,* and turn to good grass. In the fall begin to break, by bitting gradually tighter each day—within two weeks you have his head as high and graceful as nature allows. The neck should be arched and the face *vertical,* without constraint. When the bitting is accomplished, put on your harness and let the straps dangle around his legs ; continue this until he pays no attention to them, but do not fatigue the colt either in the bitting bridle or harness. The bending in of the neck is exceedingly painful and should be done by degrees, the work requiring two weeks. While in the bitting bridle, exercise him on a circle to the right and left, alternately, the radius never less than 10 to 15 feet, otherwise he will learn to step too short. Make him walk, and walk *fast* while walking ; no gait is more important, and our Agricultural Society should offer premiums for fast walkers. While harnessed, accustom the colt to wagons, sulkies, &c., by running them around and about him. Then harness to the sulky and lead him several days until he no longer notices the pushing or jostling of the vehicle. Then let one get in while another leads, and so *gradually* get him accustomed to all around him ; on finding he is not hurt he will soon become quiet. Occasionally harness double, with a steady, quiet horse, but put on no load. Teach him to back by standing in front and pressing on the bit—calling out "back," &c. *Always caress when he has done his duty.* During the second winter hitch in double, making the other horse draw all the weight and drive for a short distance (say one-quarter of a mile at a time) alternately, fast and slow. Train your colts to three gaits in harness, the fast walk always, the moderate or road gait for distance, and the rapid trot. As if we desired to make a man a good dancer, we would begin young, while the limbs were nimble and the actions graceful—so if we desire a fast walker and a fast trotter too, we must take the colt while young, and so, when pressed, he will take up the fast trot, instead of the gallop, so natural in after years. A horse can be trained that he is to trot and not break up, as well as the boy can that he is to glide but never jump in the waltz. We do not pretend that all horses will learn to trot *equally* fast, more than all the boys dance equally well, but all can be trained to exert every muscle in the trot, as well as in the run. Colts should never be driven fast for long distances; they become leg weary and cut themselves, or "interfere" as it is called. At three years old, the horse can perform very moderate work. At four, more still, but not until five should he be expected to do "day's work," and better yet if deferred until six; most horses are ruined *before* five, by early and injudicious driving or brutal treatment of some kind. The *farmer* can best use horses up to this age; all his work can be done by his brood mares and colts, and leave all his *matured* horses for market. One horse thus raised and trained is worth two such as we now often meet, and so the breeder's purse will prove who tries it.

Grooming and feeding Horses. A few words now about grooming and management. Every horse should be thoroughly cleaned each day. The bedding, instead of being thrown under his manger, to fill his food, his eyes and his lungs with ammonia, should be thrown behind him, or out of doors to air. His manger should be *kept* clean and once a week washed with salt and water, and salt left in it. One night in each week he should have a warm bran mash, eight quarts, generally given on Saturday night, as it is somewhat loosening and weakening, and the horse is presumed to be idle on Sunday. Oats are by far the best food, and ground oats wet with water is better than whole dry grain. Cut hay is a great saving, and moistened and sprinkled with ground oats, forms *the best of food*. The hull of the oats is hard and often unmasticated, and passes undigested through the system, thus taking away instead of imparting strength and nutrition. For medium sized horses, with moderate work, nine to twelve quarts of oats per day and fourteen pounds hay are ample. For large draft horses, eighteen quarts oats and sixteen pounds hay. Food consisting of one-third corn ground with two-thirds oats, form strong, hearty, *winter* food for work or coach horses. But corn is unfit for road or *fast* horses. It is too heating. Good beds and good grooming are as important as good feeding. Horses, like men, want good, dry, warm, clean beds. In grooming tie your horse so he can't bite his manger and thus learn to crib bite, and if you find your groom currying and tormenting the poor animal when tied, so he is uneasy and restless, use your stable broom over the groom's back; it is an excellent instructor to teach him to be gentle. Let the curry-comb be very moderately used on the body to loosen up the scurf and dirt, but never permit one near the mane and tail. *Rely mainly on the brush* and rough cloth for cleaning. Banish combs from your stable. They tear out more hair in a day than will grow in a month, and they ruin all the manes and tails that are ruined. The tail should be washed with castile soap and water once every week, and *brushed with a wet brush every day in the year*, holding up the bone of the tail and brushing the hair from you. Half an hour is enough for a *good* groom to one horse, but one hour's time at the outside, ample to be very complete. City horses on dry floors should have cow manure put into their feet once a week, to draw out fever and keep hoofs growing. It should be put in over night and allowed to wear out of itself. To conclude, always be gentle about your horse's body, *especially his head.* "More haste less speed," is peculiarly applicable to grooming and breaking. Use whips as little as possible; use your reason and exercise patience and kindness, and instil by precept and example the same useful lessons in those untutored creatures denominated grooms, and if you cannot inculcate wholesome truths into their heads, you can ameliorate the condition of that much abused animal, the horse, by occasionally exemplying the power of their own treatment on themselves.

METEOROLOGICAL.

Annual Summary of Meteorological Observations made at Brewer, Maine, for 1863, by W. W. Johnson.

	1863.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Annual Results.
Barometer.	Monthly mean,	29.90	29.95	29.81	29.78	29.80	29.74	29.88	29.86	29.94	29.97	29.80	29.88	29.86 inches.
	Highest observation,	30.66	30.84	30.49	30.25	30.03	30.03	30.14	30.22	30.45	30.35	30.27	30.50	30.84 "
	Lowest obsertion,	29.09	28.98	29.28	29.07	29.36	29.21	29.56	29.60	29.60	29.63	29.32	29.18	28.98 "
	Range,	1.57	1.86	1.21	1.18	.67	.82	.58	.66	.85	.72	.95	1.33	1.86 "
	Date of highest observation,	18th	5th	21st	21st	25th	13th	18th	31st	23d	29th	23d	7th	5th February.
	Date of lowest observation,	29th	20th	29th	2d	31st	1st	26th	22d	18th	9th	6th	15th	20th February.
Thermometer.	Monthly mean,	18°	16.2	12.3	32.1	45°	51.5	60°	58°	47°	41°	34°	14°	35.75 degress.
	Highest degree,	41	41	38	43	66	67	67	71	66	57	55	41°	71 "
	Lowest degree,	—16	—26	—23	14	32	38	44	38	27	15	13	—16	—26 "
	Range,	57	67	61	29	34	25	23	33	39	42	42	57	97 "
	Warmest morning,	11th	20th	26th	18th	22d	29th	7&31st	12th	13th	3 & 5th	17th	14th	12th August.
	Coldest morning,	9th	5th	14th	2d	1st	4th	23d	18th	23d	29th	30th	11th	5th February.
Winds.	North,	20	19	12	18	13	8	4	10	9	15	18	23	169=84½ days North.
	North-east,	2	2	8	9	5	6	2	1	4	2	6	8	55=27½ days North-east.
	East,	2	–	–	3	4	2	2	1	2	3	2	–	21=10½ days East.
	South-east,	4	4	5	4	10	3	6	6	3	8	2	6	61=30½ days South-east.
	South,	10	12	9	12	18	20	30	28	21	20	9	5	194=97 days South.
	South-west,	7	8	9	5	7	13	14	8	11	9	12	5	108=54 days South-west.
	West,	10	9	9	3	4	4	1	2	3	2	4	5	56=28 days West.
	North-west,	7	2	10	6	1	4	3	6	7	3	7	10	66=33 days North-west.
	Prevailing,	N.	N.	N.	N.	S.	S.	S.	S.	S.	S.	N.	N.	South prevailing.
Weather.	Fair Days,	34	35	39	28	34	41	35	38	33	32	29	33	201 fair days
	Overcast days,	28	21	23	32	28	19	37	24	27	30	31	29	164 overcast days.
	Days rain fell,	6	8	2	6	8	10	12	9	7	11	10	4	93 days on which rain fell.
	Days snow fell,	6	3	9	5	2	–	–	–	–	–	4	5	34 days on which snow fell.

Note.—Warmest day of the year, Sept. 16, 98° at 12 M. In the observations of which the above is a summary, the barometer was consulted morning and evening. The thermometer, at the coldest time in the morning, varying from 5 to 7 o'clock A. M. Notes on the wind and weather were taken morning and evening.

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