TRANSACTIONS

OF THE

Massachusetts Society

FOR THE

PROMOTION OF AGRICULTURE

FOR

1856.

[PUBLISHED BY THE SOCIETY.]

BOSTON:
WILLIAM WHITE, PRINTER TO THE STATE.
1857.

TRANSACTIONS

OF THE

Massachusetts Society

FOR THE

PROMOTION OF AGRICULTURE

FOR

1856.

[PUBLISHED BY THE SOCIETY.]

BOSTON:
WILLIAM WHITE, PRINTER TO THE STATE.
1857.

OFFICERS OF THE SOCIETY.

GEORGE W. LYMAN, *President.*
CHARLES G. LORING, *Vice-President.*
JAMES W. PAIGE, *Corresponding Secretary.*
RICHARD S. FAY, *Recording Secretary.*
THOMAS MOTLEY, Jr., *Treasurer.*

ROBERT C. WINTHROP,
SAMUEL LAWRENCE,
GEORGE PEABODY,
STEPHEN SALISBURY,
WILLIAM S. LINCOLN,
GEORGE T. BIGELOW,
} *Trustees.*

PREFACE.

In preparing for the press, with a view to a separate publication, the Report of the Massachusetts Society for the Promotion of Agriculture to the State, the Secretary has been instructed, by a vote of the Trustees, to add to the Report any information which he might deem calculated to aid in the further diffusion of knowledge relative to the interesting subject of the management of dairy stock.

In accordance with this vote, he has appended an article on the Management of Dairy Stock, by T. Horsfall, which appeared in the seventeenth volume of the Journal of the Royal Agricultural Society. The attention of the reader is particularly called to this article as being a well digested, practical essay, written in a familiar and simple style, the force and truth of which must be obvious to every one. The few other additions which have been made, are for the purpose of bringing into one volume such facts as may aid the reader in coming to correct conclusions upon this whole matter, as well as to furnish him with data upon which he may proceed to further investigations.

R. S. F.

TRANSACTIONS—1856.

INTRODUCTORY REMARKS.

The operations of the Society during the present year have been of more than usual interest. This has been occasioned by the dairy show, which took place at Worcester, under the auspices of the Worcester Agricultural Society, in connection with their usual exhibition, and by the trial of mowing machines entered in competition for the premium of one thousand dollars.

By referring to the records of the Society it will be found that from the earliest period of its existence much attention has been paid to the improvement of the breed of cattle, and more particularly with reference to dairy purposes. Importations of stock have been made from time to time at very considerable expense, and the animals have been placed in a way to disseminate their breed throughout the State. In this manner the Devon, Ayrshire and Jersey cattle have been successfully introduced. Without increased attention, however, to the keeping of stock, and more care in selection for breeding purposes, the simple act of bringing good animals into the country will do but little good. It has consequently been the aim of the Society, by the offer of liberal premiums, to advance the improvement of the stocks thus introduced, as well as to excite a more general interest in this subject.

By an arrangement made with the Worcester Agricultural Society, one day of their show was devoted to the exhibition of

the dairy stock, for which premiums were offered by this Society, although the competition was not as general as could have been desired, falling far short of the expectations of the Trustees. It has, nevertheless, been of service in awakening attention to this important branch of agricultural economy. One reason for the smallness of the numbers competing for the various premiums offered may be found in the difficulty of forwarding cattle to any distance, and the injury occasioned to dairy stock by a change of food and from exposure during the exhibition. In view of this, the Trustees would suggest that hereafter, in all cases of premiums for dairy stock, the Committees to whom the awards are confided, should visit each competing animal, examine the mode of treatment and the management of the dairy at the home of the competitor, and make the awards before the day of exhibition, requiring only successful competitors to send their animals to the show.

The Jersey cows belonging to the Society were exhibited at Worcester, and at the conclusion of the show all the animals were offered at public auction and sold without reserve. This herd has been in the possession of the Society for five years, and by an arrangement with Thomas Motley, Jr., the male progeny has been from the first his property, and all the bull calves have been raised and sold for breeders. The sale of the cows and heifers has now been made, and an opportunity afforded to the farmers of the State to possess one or more of them.

The thanks of the Trustees are most cordially given to the Worcester Agricultural Society for the ready aid and co-operation of its worthy President, Mr. John Brooks, and the other officers of the Society, upon this interesting occasion, and also to the Committees, who cheerfully gave much time and attention in making their awards. Nor will it be thought invidious or unjust, if, from the number of those who thus aided the Society, the Trustees should name in an especial manner the services of Ex-Governor Lincoln. His labors, as well as his distinguished knowledge upon the subject committed to him, sufficiently appear in his able and interesting report on the two first classes of premiums offered; it needs no word of praise to commend it to the attention of all farmers in Massachusetts. But the Trustees feel it to be a pleasure as well as a duty to

speak of one so long and so honorably distinguished in the public service, who in the retirement of private life still occupies himself so usefully and beneficially for his fellow men. Indeed, without his aid, this effort to collect and embody useful information and to excite emulation where both are so greatly needed, would have lost much of the good which it is hoped has been effected.

Not less interesting in the transactions of the society for the present year, and of special importance also, to the agricultural community, has been the competition for the premium on mowing machines. Every step made to save manual labor by the use of machinery in tilling the soil, and in bringing agriculture as nearly as possible under the control of labor-saving implements, is in the right direction. The principal means of accomplishing the economy of human labor in agriculture, as in other departments of industry, are the exercise of skill and the employment of machinery, both of which indicate a high state of advancement, and may be regarded as a true test of its progress.* There are two principal points, therefore, in relation to this subject, to which attention ought to be directed; one is, the introduction of agricultural implements, in all cases where their profitable use can be satisfactorily ascertained; the other is, that these implements be manufactured at as low a cost as possible consistent with perfect workmanship. It follows, of course, that the more general the use of any instrument is, the cheaper it can be afforded; but it is also true that, for want of skill and care in their manufacture, farmers often suffer much inconvenience, and are discouraged from purchasing and using many implements for farm work, of a really useful and labor-saving character.

Last year the trustees offered a premium of six hundred dollars, to the person who should cut not less than fifty acres of grass by a machine moved by horse or ox power. The object which the trustees had in view, was, principally, to bring out skill in the use of a mowing machine comparatively new, with-

* For a full illustration of this remark, as applied to agriculture, see "The Journal of Agriculture, &c., of the Highland Agricultural Society of Scotland." No. 53. New Series.

out reference to the particular merits of the several kinds then offered to the public. They felt strong hopes, also, that so large a premium would incite many to try the experiment of mowing with a machine, who would otherwise wait to see whether it was successful or not. In this they were not disappointed, the number of competitors for the premium having been large, and the competition very close.

It will be seen by referring to the report of last year, that although there was but one opinion upon the economy of the machine over scythe mowing, there was a general complaint of bad workmanship; and as each competitor was obliged to report every accident which his machine met with, it did not require complaints on the part of competitors to convince the trustees that *there was a screw loose somewhere.* No machine went through the trial without more or less breakages, which, although generally of a trifling nature, involved a certain loss of time.

The offering of the premium of last year resulted most successfully, since it developed a skill which has been too long dormant, and demonstrated very clearly that the mowing machine, if well made and constructed upon correct principles, might be successfully introduced and used as a great labor-saving implement throughout the State.

Having arrived at this point, the importance of perfecting this labor-saving implement, and of having one constructed that should unite every possible requisite to make its use general, being fully shown by the trials of last year, the premium of one thousand dollars was offered for the best mowing machine, to be awarded the present year. In order to do justice to competitors, and to arrive at a satisfactory result upon the merits of different machines offered in competition, the machines were subjected to separate trials in every possible way, under the inspection of three gentlemen, distinguished for their good judgment and knowledge in every thing pertaining to the matter confided to them, viz.: Col. Moses Newell, of West Newbury, Col. T. W. Ward, of Shrewsbury, and Thomas E. Payson, Esq., of Salem. They undertook the task, with a full conviction of the importance of the duty assigned to them, and devoted themselves to it with unwearied zeal. Their report, which is appended, speaks

for itself, and shows the care and labor they bestowed upon the matter, and the conclusion which they arrived at met with the unanimous approval of the trustees, who, in accordance with the report of the committee, awarded the premium of one thousand dollars to the Heath machine, entered by D. C. Henderson, of Sandusky, Ohio.

The trustees have now done all that lies in their power to introduce the mowing machine into use as a great labor-saving implement. They hope not only that it will be adopted, but that it will lead the way to the use of others equally labor-saving and quite as essential to the prosperity of agriculture in Massachusetts. Nor does there seem to be any reason why almost all the labor of the hay harvest, which is at present the most trying and expensive in its nature of any of our farming operations, should not be done by machinery worked by horse-power. The mowing machine, the hay-maker,—such as is now in use in England,—and the horserake, with the aid of two men and three horses, are quite competent to perform the work now required of twelve or fifteen men, allowing only one man per day to the acre, for cutting and making hay.

The farmers have also a duty to fulfil. It it only by their purchasing labor-saving implements, and using them whenever it is in their power to do so, that they can be perfected. In this way encouragement is given to invention and mechanical skill. Agricultural associations, with their addresses and their premiums, are valuable only as the pioneers in the march of improvement. They can direct public attention to objects, but they cannot accomplish much unless a right spirit exists in the breast of every tiller of the soil. Their labors are of little avail unless their recommendations and exhortations are met by the ready zeal of all. The great cause of agricultural improvement will always falter and move with feeble steps, when those who have it in hand are out-numbered by the listless and apathetic. The obstacles in the way of success to a Massachusetts farmer, are serious enough under the most favorable circumstances, but they are perfectly discouraging unless they can be met by the united will and firm purpose of all to overcome them. Careful investigation, and the experience gained even by common

observation of what is passing in other lands, must convince every reflecting person, that agriculture as a pursuit must languish, unless more strenuous efforts are made to increase our mechanical skill in the cultivation of the soil; and it is from this strong conviction, that the trustees thus earnestly speak upon the subject.

GEORGE W. LYMAN, *President.*

RICHARD S. FAY, *Rec'g Sec'ry.*

MOWING MACHINES.

To the Trustees of the Massachusetts Society for the Promotion of Agriculture:—

The subscribers, selected by your Honorable Board to inspect the work of the different mowing machines entered for premium, and to judge of their merits, respectfully report:—

Of the number who had signified their intention to compete for the premium, there were, at the time of our appointment, ten who had complied with the conditions on which it was offered, and had given notice of the places selected by them for the operation of their several machines, to wit: Messrs. J. C. & D. Elliott, A. Dietz, Howard & Wood, Nourse, Mason & Co., J. P. Adriance, A. D. Briggs, R. L. Allen, Jones & Thompson-E. Danforth & Co., and D. C. Henderson.

These competitors were all notified to be in readiness to mow five acres or more of grass in our presence, at the several places by them selected for that purpose, on a particular day named, a day having been assigned to each.

The Messrs. Elliott, Dietz, and Howard & Wood gave notice that they were not prepared to exhibit their machines at the time appointed, and withdrew from the contest.

Messrs. Jones & Thompson exhibited their machine, but did not attempt to mow five acres. They likewise withdrew from competition. Their machine was new, had scarcely before been tried in the grass, and its operation probably afforded as little satisfaction to them as it did to us. In its main features, and particularly in its cutting arrangement, it resembles the machine of E. Danforth & Co. As we shall notice that machine hereafter, it is not necessary to give a further description of this.

The six other competitors each cut more than five acres of grass, the time occupied varying little on the average, from one hour to an acre. The machine entered by Mr. Adriance, was the only one which did its work in less than that time. Five acres and twenty-seven rods were mowed by him, in four hours

and fifty-one minutes. In speaking of the time occupied, no deduction is made for stops.

It will be readily seen that these trials furnished very insufficient data by which to judge of the comparative merits of the different machines.

The ground had, in all cases, been selected by the competitors themselves, or by some one in their behalf. The character of the crop, and the condition of the surface varied in different localities. Generally favorable to the successful operation of a machine, some lots were much more so than others. In several instances, horses and driver were perfectly familiar with the working of the particular machine which they used, and both understood exactly what to do to show it to the best advantage. Others were worked at great disadvantage in this respect, and in one case neither horses nor driver had ever seen a mowing machine before.

In order, therefore, to give the machines a fair test on equal footing, as well for the competitors as for our own satisfaction, we concluded to operate them ourselves in the same field, under similar circumstances and in similar grass, with the same pair of horses, and a driver who had no interest in any machine. This seemed to us the readiest and most feasible mode of testing the machines, and in fact the only mode which would enable us to arrive at a decision at all satisfactory, and for which we could give a sufficient reason.

For this purpose, three lots of grass, differing in quantity, quality and situation, were obtained on the farm of Mr. Thomas J. Field, in Northfield, a driver procured who was entirely unacquainted with mowing machines, and five of the competitors notified to have their machines at Mr. Field's farm on the morning of the 29th of July. In the trial, the owners of the several machines were directed to give the driver just such instructions as they saw fit in relation to the management of their machines. Our only instruction to him was, to drive them all as nearly as possible at the same rate of speed.

E. Danforth & Co. were not notified, because, in our opinion, there is an objection to their machine, apparent on inspection, which must prevent its general use in New England. It has two sets of cutters or knives, worked by a double crank in

opposite directions, the edges of the blades of the under knife being serrated, and in their operation cutting very like shears. It has no fingers and of course no finger bar, and is probably as little liable to clog as any other machine. In many parts of the West, where it is manufactured, and where a mower may be used a whole season without once touching a stone, it undoubtedly works well. There a blade is rarely broken, while here they are constantly liable to damage, and are in fact often broken. In other machines the blades are riveted or bolted, or otherwise secured to the knife-plate, so that, in case of injury, one can be more or less readily substituted for another. The blades of Danforth's knives are not bolted or riveted upon a knife-plate, but plate and blades are one entire piece of steel, like a saw with very large, blunt teeth. They are, in fact, saw plates. The only way to repair a broken blade, therefore, is to weld it. Now we take it that few mechanics, in a machine-shop even, can weld a broken saw-tooth without injuring or destroying the entire plate. Certainly, in the country, the place where mowing machines are to be used, nobody could be found able to do it. A broken blade would probably involve the necessity of an entire new knife. This seemed to us an insuperable objection to the machine, without looking for others which may or may not exist, and for that reason we did not desire to put the Messrs. Danforth to the trouble and expense of a further trial.

The five other machines were upon the ground at the time appointed, or on the next morning.

The first lot of grass mowed contained about six acres, sown with Timothy in September last. The bottom was not thick, and the ground very far from being swarded over, might appropriately be termed dirty. The crop was not heavy, but uniform in quantity and quality. An acre was mowed by each machine.

We were satisfied at this trial, that any further experiment with the machine patented by W. H. Hovey, on the 15th of April of the present year, and entered by A. D. Briggs, was not desirable.

Without a drawing it would be difficult for us so to describe its several parts as to make ourselves understood. It is, perhaps, enough to say, that the blades are not bolted or riveted to

the knife-plate, and are yet so fastened as to be held firmly and securely in their places by an arrangement so simple that any farmer or laborer can substitute one for another without the aid of a mechanic, and almost without the aid of hammer or wrench, in an instant of time. This we consider a great merit. The knife-plate covers the finger-bar entirely, and being constantly in motion when the machine is in operation, leaves no stationary surface for the cut grass to fall and rest upon. This is claimed, by its inventor, as a great advantage. In its workmanship, also, it is quite equal to either of the other machines. But the amount of draught required to operate it, makes it a very severe load for a pair of the stoutest horses. Whether the power is wrongly applied, or whatever may be the cause, the fact is so. This, if there were no other objection, makes the use of it to any extent, in its present form, entirely impracticable.

The four other machines were tried upon another lot of grass, on pieces of equal dimensions, each in succession, both when the grass was wet, and dry. This was a heavy crop of clover, Timothy and redtop, mixed, some of which was lodged. Portions of the lot were rolling, and the surface generally quite as far from level as are our ordinary grass fields, so that upon the whole, it was an excellent lot to test the machines.

They were also tried on a meadow bottom which had never been ploughed, where various natural grasses, both coarse and fine, were intermixed.

The trial, you will thus perceive, was a thorough one, and by it we were able to form a satisfactory judgment of the merits of the different machines. The remaining machines and between which we were to judge, were patented or known as Ketchum's, Manny's, Heath's, and the Allen machine, entered by R. L. Allen. The owners of the Ketchum machine allege that Mr. Allen has infringed upon their patent, and has no right to build or sell his machine, except within the limits prescribed in a license procured from them, and that Massachusetts is not within those limits. However that may be it is of no consequence so far as our report is concerned, for we did not regard the consideration of that question as within our province, and it therefore had no weight with us. The Ketchum machine, entered

by Nourse, Mason & Co., has probably been in use longer in this State, and is more generally known, than either of the others. The one which they entered for premium differs from those which have been built by them in years past, in having a driving wheel of comparatively small size, wrought iron substituted for castings wherever it was deemed practicable, and every thing about the machine so made as to reduce its weight. In this they have succeeded; their machine, with pole and whippletrees attached, weighing only about 460 lbs. The price of the machine has also been reduced from $100 or upwards, to $75. We think that in this they have made no mistake, but that the reduction in weight is a great mistake. The difference in the amount of draught required to operate a machine of 400 lbs. weight and another of 700 lbs. weight, other things being equal, would probably be almost imperceptible, except by very accurate dynamical tests, and may it not be that the difference would then be found to be in favor of the heavier machine? Without entering into any speculation upon the matter, we think that it was a fact apparent to every careful observer, that this light Ketchum machine actually required more power of draught, when in operation, than either of the four, and that the one which required the least power of draught was almost twice as heavy. So light indeed was it, that with the weight of the driver superadded, and driven at a rate of speed sufficient to cut the grass well,—which, by the way, is a little higher than that required by the other machines,—inequalities in the surface, even slight ones, caused it to bound in such a manner as to throw up the extreme end of the finger-bar several inches above its true cutting level, leaving the stubble uneven and wavy.

Allen's machine required less power of draught than the Ketchum machine. Its weight, with pole and whippletrees, is about 600 lbs. No machine that we have seen is so readily thrown in and out of gear as is this. It has a wooden, instead of an iron finger-bar. In our opinion an iron finger-bar is preferable. The weather cannot affect it, as of necessity it must a wooden one, and the grass which falls upon it leaves it a little more readily. Outside of the driving wheel is a light wheel

which runs on a spring axle, and is claimed to be advantageous in turning and in working the machine upon a side hill.

The Manny machine also requires less power of draught than did the Ketchum machine. In this respect, the difference between it and the Allen machine was almost imperceptible. It has a wheel at the end of the knife-bar, which greatly assists in turning and backing, and makes it much more comfortable to transport from one field to another. We think that, other things being equal, a machine with a wheel at the end of the finger-bar has an advantage over a machine without it. Although very different in construction, we regard the Allen and the Manny machines as very nearly alike in point of merit, and if it had so happened that it was necessary for us to decide between those two machines, our judgment would have been made up cautiously and with much hesitation, for each has points of excellence which the other does not possess. Both these machines did their work generally well, but not so well as the work done by the Heath machine.

This, like the Manny machine, has a wheel at the end of the finger-bar. Like that, too, it has a reel, which may or may not be used, as circumstances require. But its cutting arrangement differs entirely from either of the other machines. They each have a single knife, with the blades riveted to the plate, and not operating through cast iron fingers or guards, which, especially when the knife is dull, may be liable to get filled up, and thus clog the blades. Instead of these, this machine has virtually a double set of cutters, the under set being stationary, projecting an inch beyond the upper, and thereby acting in the double capacity of guard *and* cutter. These, as well as the upper blades, are each independent of the other, and each attached to its bar by a screw bolt. The upper set of blades is held down by a spring pressure bar, so that the operation is similar to that of shears, the grass being cut between two sharp edges, and the machine working nearly as well at one rate of speed as another. In case of accident, therefore, a blade can be removed by any body and another substituted, in an instant of time. Both the upper and lower cutters are made like the best edge-tools in use, of the best cast-steel, with wrought iron backs. The iron furnishing strength, the steel can be made as hard as desirable, without so

much danger of breaking by use, and being made hard, do not require to be so often ground. The lower cutter, or guard, as you may please to call it, is half an inch thick and one and one-fourth inches wide. The upper blades are about twice as thick as those used on any other machine. This machine very evidently required less power of draught than either of the others, and did its work the best. The Manny machine weighed about 600 lbs. This weighs about 850 lbs. In its cutting apparatus, which is, perhaps, the most important feature of a mowing machine, we regard it as *very much* superior to either of the others. In its ease of draught, perhaps the next most important feature, we regard it as superior. We regard it also as less liable to clog than any machine with fingers or guards, like those of Ketchum, Manny and Allen. In other *important* features it is equal to the other machines.

We therefore unhesitatingly, confidently and unanimously, express the opinion, that the Heath machine, entered by D. C. Henderson, is entitled to the premium of one thousand dollars, if that premium is awarded the present year.

MOSES NEWELL.
THOMAS E. PAYSON.
THOMAS W. WARD.

BOSTON, September 12, 1856.

DAIRY STOCK.

REPORT OF THE COMMITTEE TO THE TRUSTEES OF THE MASSACHUSETTS SOCIETY FOR THE PROMOTION OF AGRICULTURE.

The committee to whom was assigned the service of adjudging the premiums for dairy stock, under Classes No. 1 and No. 2 in the proposals offered by the trustees of the Massachusetts Society for the Promotion of Agriculture, have given that attention to the discharge of their commission, which the brief opportunity afforded for a personal examination of the animals exhibited in the pens, and a consideration of the not very precisely definite statements of the exhibitors, would permit. It must be obvious, that the first inquiry which would suggest itself to the minds of the members of the committee, would be, what is the standard of excellence,—or, in other words, what constitutes the best dairy cow? At first view, the rules prescribed would seem to imply that the quantity of milk of each cow, ascertained for the first three days of each month of trial, and the amount of butter and cheese manufactured from all the milk, during the whole period of trial, might satisfy the object of the proposals. But this would be but a narrow construction of the purpose designed by the trustees. Nor, added to this, would the judgment of the committee upon the appearance of the animals, fulfil the scope of the inquiry. Whatever the product of the cow, or however symmetrical her proportions and apparent points of excellence, to the eye or the touch, there are other matters which enter largely into a proper consideration of the award of the proffered premiums. The true purpose of the exhibition was not merely to make a show of fine animals, however gratifying this might be to the spectators, but by far the higher and more important end of eliciting information, and acquiring knowledge of well-authenticated facts and results, which would instruct the community of practical farmers, and offer to them richer inducements to the improvement of their stock than any transient success in a cattle show competition.

It was this communication of the peculiar qualities of animals, best suited to the dairy,—of the preference to be given for these qualities, among the various races,—of the relative product of the different breeds,—of the expense of their keeping, and their docility under management,—and of the arrangement and conduct of the dairy, which were primarily sought; and unless these are furnished, in *substantial* compliance with the requisitions accompanying the proposals, the object for which alone the premiums were offered, and to which the hopes and labors of the trustees have been directed, has not been obtained. The money may, indeed, add to the rewards of a few well-managing and prosperous dairymen, but will do little for the community of farmers, who have looked to this occasion for a communication of knowledge and skill in a leading department of agricultural industry.

It is now more than a year since the trustees of the State Society, with munificent liberality, appropriated a sum exceeding two thousand dollars, for the encouragement of dairy stock, of which sum one thousand and fifty dollars were offered, in published proposals of premiums, for dairy cows, in two classes of six and four animals respectively, to be exhibited at the annual cattle show of the Worcester County Society, the present year. The competition was made open to farmers from all parts of the State; and to equalize localities, as far as might be, liberal compensation for travel was provided for competitors, in proportion to their distances from the show. Four premiums were proposed in each class, varying in the first class, from $250, the highest, to $100, which was the lowest; and in the second class, from $150 to $40. It might have been expected that an amount of bounty so nearly corresponding with the value of the animals to be exhibited, and so richly remunerative of any care and labor in giving an account of their qualities, and their management and product for a single season, to say nothing of the incentives and influences of a public spirit, would have secured general attention, and attracted numerous competitors in the trial. The committee have to regret that such has not been the case. There are even fewer competitors than the number of premiums offered for distribution; and of these, with a single exception, all are from the county of Worcester.

After the repeated efforts which, in years past, have been ineffectually made to obtain, by statement and exhibition, the means of comparison and preference between the dairy stock of different districts of the Commonwealth, and to gather reliable information of the product of dairies and the mode of their management, there is little to encourage a persistence in this mode of inquiry. But we may be comforted in the assurance, that the progress of improvement, though slow, will be certain to follow individual interest and enterprise, and trust to time, at last, for the fruits of experience and success.

The committee received from the secretary of the trustees, the written statements filed with him, pursuant to the requirement, of five persons claiming to be competitors for premiums, in the first class, and of two persons claiming to compete for premiums, in the second class. An analysis of these voluminous papers, and an exhibit of the material facts, in an abstract from the representations which they contain, will show how far the respective competitors have entitled themselves to consideration, and how far, to any useful purpose, they have satisfied public expectations and subserved the interest which they were called upon to advance.

Under Class 1.—"For the best six dairy cows, which have been owned and kept together from July 1, 1855, to the day of the show, and at least three of which cows shall have been bred and raised, or imported, by the competitors,"—

John Mann, of Worcester, entered, and presented his statement of the ownership and keeping of six cows, four of them being raised by himself. They were from a herd of 21 cows kept together, and their ages, respectively, 10, 5, 5, 9, 9, and 4, and their breed denominated "grade." Their product in milk, for the first three days in nine months, from December 1, to August 1, both inclusive, was 3,355 lbs. 4 oz., or 1,299 quarts 1 pint, which yielded 156 lbs. 4 oz. of butter. The whole produce of the nine months is not given, nor does it any where appear from Mr. Mann's statement, that, except for the first three days of each month, the milk was manufactured into butter or cheese, according to the requirement. In answer to the inquiry as to the process of manufacturing, he states: "That for the last

eight years he had not made much butter, having sold the milk. The way he did, last winter, was to put three quarts in a pan and set it up stairs, where it would not freeze, till it was three days old. In the summer, the same in a pan, and put it down cellar, and let it set till it was sour." Mr. Mann fed to his stock of cows last winter, with his hay, 3,500 lbs. of shorts, at $25 per ton; 302 bushels of corn and cob-meal; 100 bushels of carrots; 50 bushels of turnips; and 50 bushels of small potatoes,—the meal being mixed with wet hay,—and after the 12th of February he gave swill once a day to those yielding the most milk, instead of meal on their hay. He keeps his cows in the barn through the night in summer. There is nothing otherwise peculiar in his management.

One of Mr. Mann's cows, 10 years old, gave, in the first three days of February, 49 quarts of strained milk; and the same quantity the first three days in June, according to his statement. His six cows yielded, on the first three days of June, 224 quarts of milk.

Samuel Ellsworth, of Barre, entered six cows, of eleven kept together, of the ages respectively of 9, 6, 7, 10, 3 and 3, grade Durham. Three of the six raised by himself.

In the first three days of the nine months of trial, they produced 2,948 lbs. of milk, or 1,165 quarts 1½ pint, yielding 105 lbs. 14 oz. of butter, and 138 lbs. 8 oz. cheese. The whole product of the season was—butter, 772 lbs.; new milk cheese, 1,251¾ lbs.; skim milk, 580½ lbs. Mr. Ellsworth gives the following as his process of manufacture: "My manner of making butter is to set the milk in tin pans, about half full, in a warm room, in winter, with good air; let the milk stand about forty-eight hours, then take off the cream, put in stone jars with a little salt, and stir thoroughly every day until churned. After churning, draw off the buttermilk and wash in two waters, then salt to the taste; let it stand twenty-four hours, then worked by hand and put in stone jars, and cover it closely from the air. In the summer, the milk is set in a cool place, the cream in stone jars in the cellar, and the butter made in the same manner as above."

The extraordinary yield of Mr. Ellsworth's cows, considering

the ages of two of them, and the length of time in which others had been in milk, will justify giving his full account of their keeping. "From November 15 to May 15, the cows were kept in the stable, except when turned out to water. Their food was English hay and straw mixed, also corn fodder through the month of December. Extra hay, a peck of English turnips each, January. English hay and half peck of carrots each, February. Hay and half a peck of potatoes each, until the 15th of March; then one quart dry Indian meal per day to each cow, with half peck of potatoes; then the same quantity of meal, with cut hay wet, to the time of turning to pasture, and no extra feed after. The cows were turned to after feed of the mowing about August 10th. No extra feed while in the pasture."

The largest yield of milk by either of Mr. Ellsworth's cows, for the first three days of any month, was in July, by "Cream-pot," 6 years old, one-fourth Durham—55 quarts 1½ pint—and the greatest quantity given by his six cows in the first three days of either month, was 224 quarts in August.

Asa G. Sheldon, of Wilmington, entered six cows of the respective ages of 4, 4, 5, 6, 7 and 10 years, kept together in a herd of eight, all native but one, and that one native, with a cross of Durham—three of them raised by himself.

Mr. Sheldon gives the product as follows:—

For the first three days of the nine months from December 1, 2,230 lbs. 2 oz., or 927 quarts 1 pint of milk, yielding 134 lbs. 15 oz. butter. The whole product of the season, to September 1, was 983 lbs. of butter, 215¼ lbs. of which, manufactured from the 1st of December to the 1st of June, he sold at 25 cts., and the residue, from June 1, at 30 cts. per lb. Of the process of manufacture, he gives but a meagre and wholly uninstructive account, confined to the simple statement, that "the milk was strained into tin pans, set in a room above ground, and the dates of the several churnings," (which he gave in a table,) "showing how long the milk was kept." On recurring to this table, it appeared that the churning in June was, on an average, about once in three days; in July and August, once in about two days, and in the cooler months much less frequently. It might well have been expected from a competitor, whose whole

product of the dairy was in the manufacture of butter for the market at high prices, that his mode of preparing the milk and cream, selecting and preserving his dairy utensils and vessels, process of churning and working the butter, and the economy of his dairy room, would afford much useful direction to the good management of others, and if his answer may be considered as satisfying the *letter* of the interrogatory in the proposals, it may be truly said, that it is, at best, but a poor compliance with the *spirit* and *object* of the inquiry. In regard to the manner of keeping the stock, Mr. Sheldon is more explicit. He states, that his cows were turned into a back pasture as early as the middle of April, and into a good pasture the first of June. Since he commenced digging potatoes for the market, they have eaten the small ones, when he had them to spare, and when not, they have had green corn fodder. From October to May, their food was principally meadow hay, with husks and stalks, and one peck of turnips or carrots per day, to each cow, until they were all used. After this, they were fed with meadow hay cut, and fine feed mixed with sweetened water, each cow being allowed three pounds of fine feed and half a pint of molasses per day; while they were in the back pasture in the spring, they had the same allowance.

The greatest quantity of milk from either of Mr. Sheldon's cows, in the first three days of either month of trial, was 49 quarts, in June, by a native cow, five years old; and the greatest quantity by the six cows, in the first three days of either month, was 248 quarts and half a pint, in July.

William Robinson, Jr., of Barre, entered six cows, of a dairy of eighteen kept together, (four raised by himself,) of the ages of 10, 5, 7, 8, 8, 8, respectively; grade, Durham. Their product, in the first three days of the nine months of trial, was 3,292 lbs., or 1,462 quarts of milk, made into 311 lbs. of cheese. The product of the whole season of trial was, 21 lbs. of butter and 2,954 lbs of cheese.

Mr. Robinson gives the following very brief and unsatisfactory account of his mode of manufacture: "In summer we run up milk twice a day, and then keep our curd one day, and manufacture it into cheese. In winter, we run our milk until we

get enough for a cheese, and then warm the milk and stir in the cream, and make it into cheese the same day."

Of his treatment of his stock, and their keeping, he states that his cows were turned to pasture May 4, and fed on hay morning and evening until the 11th, and afterwards had nothing but pasture feed, except corn fodder eight days, the last of August. From December 1, they were kept on corn fodder, straw and poor hay, until the first of March, then each had good hay, and two quarts ears of corn and oats ground together, per day, until the 11th of May.

William W. Watson, of Princeton, presented his claims for six cows, of ten kept together; ages 12, 11, 9, 7, 6, and 5 years. One Durham, two one-half Durham and one-half Ayrshire, one one-half Durham and one-half native, and two one-half Durham and one-half Holderness.

Of the product of these six cows, Mr. Watson gives no detailed account, except for the first three days of the months of June, July and August, of which he states the yield to be 1,655 lbs. 4 oz., or 831 quarts 1½ pint of milk, making 199 lbs. 11 oz. of cheese. The whole amount manufactured during the prescribed period of trial, from December 1, to August 31, both inclusive, he sets down at 2,031 lbs 11 oz. of cheese.

Of the process of manufacture, in answer to the interrogatory, his statement is only in these words: "Set the milk as soon as milked, at sunrise and sundown—make cheese night and morning."

Of the manner of keeping his stock, he answers, that they "were turned to pasture May 25, 1856, had good pasturing, and were driven a mile night and morning. They were stabled from November 15, 1855, to May 25. Food, first month, wheat straw and husks; second and third months, wheat straw and husks, with hay once a day; fourth, fifth and sixth months, half English and half meadow hay; drink, water; calving time, two quarts of meal a day for one week."

The greatest yield of milk by either of Mr. Watson's cows, for the first three days of either of the months, of which he gives an account, was 52 qts. in July, by his half Durham and half native cow, 6 years old. The greatest quantity of his six

cows in the first three days of either month, was 285 quarts $1\frac{1}{2}$ pint in June.

Mr. Watson has neglected to state any account of the quantity of milk by his six cows, or either of them, on first three days of the first six months of the prescribed period of trial. Nor does it appear that three at least, or how many, of the cows were bred and raised by himself; nor is the statement, filed by him, (such as it is,) either subscribed or sworn to, in conformity with the requirement.

Under Class 2.—"For the best four dairy cows, owned and kept from July 1, 1855, to the day of the show, at least one of which shall have been bred and raised, or imported, by the competitors," there were but two entries, with statements in writing filed with the secretary, according to the proposals.

Amos F. Knight, of West Boylston, entered four cows, of which he gave the following statement: That their ages, respectively, were 18, 12, 11, and 4 years—two of them of the native breed; one one-half Devon, and one one-half Ayrshire, and that one of them was bred by himself. They were kept together with three other cows and two two-year old heifers.

The product of milk of these four cows, for the first three days of each month of trial, from December 1, 1855, to September 1, 1856, both inclusive, had been 1,583 lbs. 10 oz., or 634 quarts, which made into butter, gave 57 lbs. 3 oz.

The whole product for the entire period of trial, was 645 lbs. and 1 oz. of butter.

His cows were turned to pasture May 12, during the day, and fed from the barn morning and night, until the 20th, after which they were kept on grass only, except that since the 8th of August they have had corn fodder once a day. His practice is to keep his cows in the stable every night through the year; and while fed from the barn, they are foddered twice in the morning, once at noon, and twice at night—watered morning and night, and left out only long enough to drink, unless the weather is warm. From the first of March they are carded once a day. Of food, other than hay, he fed to his stock, while in the stable, subsequent to December 1, 1855, 8 bushels of pumpkins, 80 lbs. of oil cake, $24\frac{1}{2}$ bushels of English turnips,

410 lbs. of shorts, 69 bushels of carrots and 5½ bushels of cob and corn meal. Each cow had one peck of turnips or carrots per day, in the morning, and the shorts and meal were fed on cut hay.

In reference to the process of manufacture, Mr. Knight states, that "after the milk is drawn from the cows, which is done about sunrise in the morning, and at five o'clock in the afternoon, during the summer, it is carried to the milk room or cellar and strained into tin pans, from two quarts to three quarts to a pan. The time the milk stands before skimming, varies with the weather, generally from 36 to 48 hours. In the warmest weather, the creampots are set on the ice the night before we churn. We churn twice a week. When the butter is taken from the churn, the buttermilk worked out as clear as it can be and salted, it is set away for 24 hours, when it is worked over and set away for 24 hours more. It is then worked over again, weighed into pound balls and lumped for the market. We generally sell our milk in the winter. I have 30 cents per lb. for my butter, through the season." Mr. Knight notes that his best cow did not do well in calving, grew afterwards poor, and for a while gave but little milk. It will be observed, also, that another was 18 years old.

The greatest yield of milk of either one cow, on any three of the first days of the month, was 41 quarts 1½ pint, by a native cow 12 years old. The greatest yield by the four cows, on the first three days of any month, was 147 quarts 1½ pint, in June.

William Robinson, Jr., of Barre, entered also in the second Class, four cows, of a dairy of eighteen kept together, their breed, grade Durham, all raised by himself, and the ages of three of them stated as 7, 8, and 10 years, respectively.

The account of their product is as follows, viz.:—

For the first three days of each month of trial, 1,948 lbs., or 859 quarts 1¼ pint of milk, which manufactured, gave 4 lbs. 12 oz. of butter, and 182 lbs. of cheese. The product of the manufactured milk of all the cows, for the whole time, was 42 lbs. of butter, and 1,559 lbs. of cheese.

The cows were turned to pasture May 4, and fed on hay morning and evening, until May 11, and after had nothing but

pasture feed, except corn fodder the last eight days in August. In winter, subsequent to December 1, 1855, they were kept on corn fodder, straw, and poor hay, until the first of March, 1856, and then had good hay, with two quarts of meal, made from ears of corn and oats ground together, fed to each cow per day, to the 11th of March.

Mr. Robinson's reply to the interrogatory—"What is your process of manufacturing in summer and in winter, specifying the difference, if any, in the manner of keeping the milk and cream, the frequency of manufacture, the course of management in all its stages?" is, (as was his answer to the same interrogatory under his entry in Class 1, proposed alike to all the competitors,) "In summer we run up the milk twice a day, keep our curd one day, and manufacture it into cheese. In winter, we keep our milk until we get enough for a cheese, then warm the milk and stir in the cream and make it into cheese, the same day."

The greatest yield of milk of either one of Mr. Robinson's four cows, for the first three days of any month, was 59 quarts and ½ pint, in June, and the largest yield of the four cows, for the first three days of any month, was 206 quarts and 1 pint, in July.

The committee have thus gone through with a careful analysis and abstract from all the statements made by the respective competitors. They have endeavored to do full justice to their representations in all material respects, giving them in the very words, or deducing the results from the figures of the claimants themselves. There has been a noticeable neglect, on the part of some of them, to answer with explicitness, many of the inquiries propounded in the forms for the returns. In respect to the period for which the cows were dry, for instance, while some have set down the dates of their becoming dry, and of their subsequent calving, others have given but a single date, as December 1, or the last of January, when all their cows were dried; while others, without dates, have stated the length of time in which their cows were not in milk. From such data, so far as the committee could form an opinion, it appears, that the average period in which the cows were out of milk, has

been about two months, and on recurring, in this connection, to the mode of feeding, it is made obvious as a general truth, that the best kept animals go dry the shortest time.

As to "grooming" the cattle, which was made a subject of inquiry by the trustees, we have nothing in reply. The use of the card, the curry-comb and the brush, is not even mentioned, except by Mr. Knight, who only states, that "from the 1st of March, his cows were carded once a day." Nor is any thing said of litter for the cows in the stalls, that they may lie at their ease, and be kept dry and clean. Now the committee believe that there may be a judicious and profitable application of the card and curry-comb and brush, daily, and as to littering cows in the stable, if there were dairy maids in the land as there once were, and they did the milking as was done in the good olden times of domestic industry and frugality, the practice could not be neglected. In other particulars, the interrogatories are either entirely disregarded, or the answers are so general and vague as to convey but little information. In these respects the committee cannot but lament, that the proffered liberality of the trustees has been so fruitless of anticipated results, and that the exhibition, with all that has been attractive in the appearance of the stock, will still leave us without that instruction which would direct to its most profitable selection and use.

But however barren and unsatisfactory may have been the written communications of the competitors, the exhibition of these animals in the pens has not been without its gratifications. The cattle have spoken better things for themselves than the credit given them by the written statements of their owners. In general, the cows were noble looking creatures, showing much beauty of form, good size, and the best points in milking qualities. Mr. Ellsworth's six Durham grade cows were especially noticeable for their size and imposing appearance. His two heifers, three years old, in the judgment of the committee, are quite as promising as any which were exhibited, and all bore evidence of good care and judicious breeding. Mr. Robinson's cows, though showing good points, were inferior, both in size and condition, to those of Mr. Ellsworth, but they gave, strongly, the mark of the Durham blood. The cows of Mr. Sheldon, all of native stock but one, and that of the Durham

race, had excellent milking points, and considering they had been driven more than fifty miles to the show, while in full milk, were in excellent condition. Mr. Knight's cows, two of native breed, one a cross with the Devons and another with the Durhams, show their good points very favorably, but the old cow of eighteen years, by his own admission, had been kept at least one year too long, and was thin in flesh and obviously failing.

Mr. Mann's cows, from a herd of twenty-one kept together, did not escape the particular notice of the committee. In blood, they were represented as "grade," and they bore evident marks of the cross of the native with the shorthorns. Some of them had admirable milking points, and certainly all did credit, in their condition and appearance, to the generous keeping they received, according to the statement of their owner, especially during the preceding winter.

Upon applying the prescribed rules to the statements of the several competitors, in Class No. 1, the committee are unanimously of opinion, that Mr. Mann has not maintained his claim to competition. He has given no account of the manufacture of his milk, except for the first three days of each month, nor of the whole yield of milk, either manufactured or unmanufactured. The rule is explicit and imperative, that, in Classes No. 1 and No. 2, "all the milk must be manufactured into butter and cheese, during the whole period of trial," and without this compliance on his part, there could be no just comparison and decision between the productiveness, qualities and value of his cows, and the cows of other competitors. In the absence of the account, the presumption is, that, except in one part of the required trial, that of the product of the first three days of the months, the milk was neither manufactured, nor the quantity noted, but that, as he states to have been his practice for past years, it was sold in the market. This neglect of Mr. Mann to keep an account is the more to be regretted, inasmuch as the trial, so far as he proceeded, shows a better result than that of either other competitor. It would have been important also, upon another point of inquiry, how far the expense of high keeping found a corresponding recompense in the greater productiveness of milk made into butter or cheese, Mr. Mann

having fed his stock far more richly, as will be seen by his statement, than any other competitor.

For a like reason of non-compliance with the rules, and in much more considerable and material respects, the claims of Mr. Watson must have been excluded from competition for the premiums. He had rendered no account of the product of his cows previous to June, 1856, altogether omitting in his statement their yield for any part of the preceding six months of the period of trial. His cows were not seen in the pens, and it was understood that he withdrew from the competition.

The claims to premiums in Class No. 1 are thus reduced to three competitors, and the committee find, upon examination and comparison of results, that between them, the cows of Mr. Ellsworth were altogether the most productive. By his statement, it appears that he manufactured from the milk of his six cows, during the whole period of trial, 772 lbs. of butter, and 1,251¾ lbs. of cheese. Charging the butter at 30 cents per lb., would give $231.60 ; and the cheese at 10 cents per lb., $125.17 —making an aggregate value of $356.77. Or estimating the produce of milk in butter as equal in quantity to three times the same weight in cheese, adding to this the quantity of cheese actually made, and so stating the account, would give an equivalent to 356 lbs. of cheese, and the same pecuniary result. This sum, as will be perceived by tables which the committee have prepared to accompany this report, exceeds, by more than fifty dollars, the value of the product of any other competitor. Added to this, Mr. Ellsworth gives an account of 540½ lbs. of skim-milk cheese, manufactured during the same period, which the committee have not taken into the estimate, as it may fairly be offset against the whey or buttermilk of other competitors, of which no account is required.

As between Mr. Ellsworth and Mr. Robinson, one of his competitors, it should be remarked, that the yield of milk by the cows of the latter, in the first three days of the month of trial, was greater, both in weight and quantity, than that produced by the cows of the former ; but the manufactured product, stated in the equivalent of cheese, was by 550 lbs. less. Whether this was owing to the richer quality of the milk of Mr. Ellsworth's cows, or his more perfect process of manufacture, the committee

have no means to decide. His cows were somewhat better fed in the winter, but two of them were only three years old, while all of Mr. Robinson's were of mature age. The cows of both were of the same breed, grade Durham.

The committee unanimously adjudge to Samuel Ellsworth, of Barre, for the best six dairy cows, the first premium of $250.

To Asa G. Sheldon, of Wilmington, for his six cows, the committee adjudge the second premium of $200.

As between Mr. Sheldon and his competitor Mr. Robinson, the committee find from their statements, respectively, that Mr. Robinson's cows, for the first three days of each month of trial, yielded in the aggregate 3,292 lbs. 4 oz., or 1,462 quarts of milk, to 2,230 lbs. 2 oz., or 927 quarts 1 pint of Mr. Sheldon's. But the lesser weight and quantity of milk of Mr. Sheldon's cows produced 134 lbs. 15 oz. of butter, equal to 402 lbs. 13 oz. of cheese, to 311 lbs. of cheese actually manufactured from the milk of Mr. Robinson's cows. The whole value of the product in butter, for the entire period of trial, of Mr. Sheldon's cows, at 30 cents per pound, is $294.90; and that of 21 pounds of butter, equal to 63 lbs. of cheese, added to 2,954 lbs. of cheese, manufactured in the same period from the milk of Mr. Robinson's cows, at 10 cents per pound, gives $301.07. Two of Mr. Sheldon's cows, however, were but four years old, while three of Mr. Robinson's were eight; the ages of the residue of both competitors comparing well with each other. It will be seen, that the advantage here was greatly on the side of Mr. Robinson. Mr. Sheldon's cows were better fed than Mr. Robinson's, during the winter; but, in the judgment of the committee, this will not sufficiently account for the greater richness of their milk, as shown in the product of butter. Besides, it is found, by recurrence to the tabular monthly statements of both competitors, that the greater disproportion in the manufactured product to the yield of milk, was in the summer season, while the cattle were at pasture.

For the reason assigned, in the case of Mr. Ellsworth, no allowance is made by the committee for the buttermilk set down by Mr. Sheldon as sold by him for $90; nor of two fat calves, at $19.50, as there are no returns, under the prescribed rules, from other competitors, by which a comparison of other pro-

ducts than milk manufactured into butter and cheese could be made. Besides, it is not stated in what manner the calves were fattened. Other competitors raised their calves, and doubtless all had whey or buttermilk from the dairy in proportion to their manufactured milk.

It is proper to note, that Mr. Sheldon ingenuously stated, that one of his cows had been hired out, before he knew of the proposals, from July to November, 1855, but in the mean time was owned by him, and had been returned and kept with the others during the whole period of trial. The committee are unanimously of opinion, that this circumstance should not operate as a forfeiture of his claims, the spirit of the rule in relation thereto evidently intending only to restrain the procurement of cows after the proposals were issued, with the express purpose of successful competition for a premium. This cow was kept with the rest, and subjected with them to all the required tests of product.

It remains to the committee to assign to William Robinson, Jr., of Barre, for his six cows, the third premium of $150.

In Class 2.—For the best dairy cows, the committee, as between Mr. Robinson and Mr. Knight, could have little question of precedence. Mr. Robinson's cows, for the first three days of the months of trial, gave an aggregate of 1,948 lbs. of milk, or 859 quarts 1½ pint, producing 4 lbs. 12 oz. of butter, equal to 13 lbs. 8 oz. of cheese, which with 182 lbs. of manufactured cheese, makes 195 lbs. 8 oz., against 1,583 lbs. 10 oz., or 634 quarts 1 pint of milk, manufactured into 57 lbs. 3 oz. of butter, equal to 171 lbs. 9 oz. of cheese, the product of Mr. Knight's cows. But the entire value of the product of Mr. Robinson's cows, for the whole period of trial, was but $168.50, to $193.50 from the cows of Mr. Knight. Now the prize offered is for the best dairy cows, and not for the cows which may give the most milk; and surely those must be best which yield the greatest dairy product, in proportion to their milk, in butter and cheese. The cows of Mr. Knight appear to have been better kept, especially in the winter, than those of Mr. Robinson, and his herd was not so numerous; but these considerations do not outweigh the advantage which the latter had in the better ages

of his animals, and the great disproportion in the value of their dairy product.

The committee adjudge, in Class 2, to Amos F. Knight, of West Boylston, for the four best cows, the first premium of $150; and to William Robinson, Jr., of Barre, the second premium of $100.

The committee paid little regard to the consideration of allowance, suggested by Mr. Knight, that one of his cows was 18 years old. They cannot approve of the keeping of cows to that advanced age, for, under no circumstances, can it be economical. With rare exceptional cases, they should not be continued in the dairy beyond the age of 12 years.

The credit is due to Mr. Knight for having given the *best* of the imperfect accounts of the process of the manufacture of butter.

The comparisons before stated of the yield of milk, and products of its manufacture into butter and cheese, from the cows of Mr. Ellsworth, Mr. Robinson and Mr. Sheldon, in Class 1, and from the cows of Mr. Robinson and Mr. Knight in Class 2, present, in a striking point of view, the interesting and much vexed questions, whether some cows or races of cows, do not possess peculiar qualities for the product of butter or of cheese, and not alike for both; and what are the points of discrimination, and the distinguishing characteristics of breed or blood for either?

With the permission of the trustees, the committee would recommend, in consideration that Mr. Mann pursued the tests of the products of his cows, and rendered statements of the results for a part of the season of trial, and has incurred expense and the loss of the use of these cows for several days, in bringing them to the show, and that his cows are really fine animals, adding much to the interest of the exhibition, there should be given to Mr. Mann a gratuity of twenty-five dollars.

In conclusion of this already too extended report, the committee cannot deny to themselves the gratification of offering their congratulations, and expressing their warmest thanks to the trustees of the Massachusetts Society, for the beautiful display of dairy stock, of all classes, which their enlightened liber-

ality has brought to the field of exhibition. So fine and valuable animals in this department of rural economy, and of ownership in this Commonwealth, it is believed, have not before been witnessed at any of our shows. They have here been seen by thousands of admiring spectators, and their worth will be made better known to a great body of practical agriculturists. If past efforts to obtain written statements of the properties and value of good stock have proved, to a great degree, unavailing, such opportunities will speak more impressively to the pride and interest of the farmer, and ultimately secure its more general possession and diffusion.*

The committee submit, with the report, the written statements of all the competitors, which, however, from the repetition and complexity of the questions and answers, can serve only for reference.

For, and in behalf, and by order of the committee,

LEVI LINCOLN, *Chairman.*

AGRICULTURAL HALL, WORCESTER,
September 26, 1856.

* The indefiniteness and meagreness of the statements of the various competitors for the premiums of the Massachusetts Society, are regretted, not only by the Committee, but by all who read and study them for the purpose of obtaining knowledge and skill in the matters to which they relate. It is very desirable that all persons making entries to the different agricultural societies of the Commonwealth, should be informed, that in awarding the premiums offered, the Committees will be governed by the rules pertaining thereto. These are definite, and easily understood. The statements should embody all the facts coming under the notice of the producer of the article offered for premium. These may seem too trivial to be noted by the experienced farmer, or amateur. Not so to the inexperienced, or the beginner. To such, they are the elements of that art whose thorough knowledge comprises an understanding of the practical economy of good husbandry. Hence the importance of full and accurate statements.—ED.

TABLE OF PRODUCT.

Class 1.—Six Cows.	Product of Milk—First three days in every month.				Manufactured into Butter.		Manufactured into Cheese.		Greatest quantity of milk from all the cows in 3 days.			Greatest quantity of milk from one cow in 3 days.		Whole product of Butter and Cheese from all the cows through the trial. Butter.		Whole product of Butter and Cheese from all the cows through the trial. Cheese.	
	lbs.	oz.	qts.	pts.	lbs.	oz.	lbs.	oz.	qts.	pts.		qts.	pts.	lbs.	oz.	lbs.	oz.
John Mann,	3,354	8	1,399	1	136	4	–	–	224		in June.	49		in Feb. & June By Fanny, 9 yrs. Grade.	No return.		
Samuel Ellsworth,	2,298		1,165	1½	105	12	138	8	224		in August.	55	1½	in July. By Creampot, 6 y. ¼ Durham.	772	–	1,251	12
Asa G. Sheldon,	2,230	2	927	1	134	15	–	–	248	1	in July.	49		in June. Native, 5 years.	983	–	–	–
William Robinson, Jr.,	3,292	4	1,462		–	–	311	–	360	1½	in June.	63	1½	in June. No. 1, 10 years. Grade—Durham.	21	–	2,954	–
William W. Watson,	1,654	12	832	1½	–	–	199	–	285	1½	in June.	52	½	in July. No. 1, 6 years. ½ Nat. & ½ Dur'm.	–	–	2,031	–
Class 2.—Four Cows.																		
Amos F. Knight,	1,583	10	634	1	57	3	–	–	147	1½	in June.	41	½	in June. No. 2, 12 years. Native	645	1	–	–
William Robinson, Jr.,	1,948	.	859	1½	4	12	182	–	206	1	in July.	59	½	in June. No. 7, 8 years. Grade—Durham.	42	–	1,559	–

William W. Watson, Product of Milk: 3 days in June, 561.8; 3 " July, 571.4; 3 " August, 522 — 285.1½; 285.1; 261.1

William W. Watson, Cheese: 68.6; 68.8; 68.2

NOTE.—Mr. Ellsworth, in addition to his butter and cheese, stated in the foregoing Table, rendered an account of 580½ lbs. of skim-milk cheese, which the Committee have not regarded in their estimate of the product, as it may be fairly set off against the whey and buttermilk of other competitors, of which no account is required.

For the same reason, in the comparison of product, the Committee have not taken into their estimate the statement of Mr. Sheldon, of two fattened calves, sold by him for $19.50, and buttermilk sold for $90. As he gives no account of the manner in which the calves were fattened, and as to the buttermilk, other competitors may have had an equivalent, of which no account is given.

TABLE OF PRODUCT.

Class 1.—Six Cows.	Estimated Value for the whole period of trial.			Product in Butter and Cheese, reduced to the equivalent in Cheese, at the rate of 1 lb. of Butter to 3 lbs. of Cheese, and the account of product would then stand thus.	
John Mann,	No return for the whole period of trial.				
Samuel Ellsworth,	Butter, 772 lbs.,	at 30 cts., is $231 60	$356 77	772 lbs. of Butter, equal to 2,316 lbs. Cheese. Manufactured Cheese, 1,251 Total, 3,567 lbs. Cheese, at 10 cts.,	$356 70
	Cheese, 1,251	10 cts., is 125 17			
Asa G. Sheldon,	Butter, 983 lbs.,	at 30 cts., is	294 90	983 lbs. of Butter, equal to 2,947 lbs. Cheese, at 10 cts.,	294 90
William Robinson, Jr.,	Butter, 21 lbs.,	at 30 cts., is $6 30	301 70	21 lbs. of Butter, equal to 63 lbs. Cheese. Manufactured Cheese, 2,954 lbs. Total, 3,017 lbs. Cheese, at 10 cts ,	301 70
	Cheese, 2,954	at 10 cts., is 295 40			
William W. Watson,	Cheese, 2,031 lbs. 10 oz., at 10 cts., is		203 16	2,031 lbs. Cheese,	203 16
Class 2.—Four Cows.					
Amos F. Knight,	Butter, 645 lbs. 1 oz., at 30 cts., is		193 50	645 lbs. 1 oz. of Butter, equal to 1,935 lbs. 3 oz. Cheese,	193 50
William Robinson, Jr.,	Butter, 42 lbs.,	at 30 cts., is $12 60	168 50	42 lbs. Butter equal to 126 lbs. Cheese. Manufactured Cheese, 1,559 lbs. Total, 1,685 lbs. Cheese, at 10 cts.,	168 50
	Cheese, 1,559	at 10 cts., is 155 90			

REPORT OF THE COMMITTEE ON CLASS NO. 4.

There were but two entries in this Class. William W. Watson, of Princeton, exhibited a small native cow ten years old, which, according to his statement, yielded as follows:—

	lbs.	oz.
The three first days of March, (Butter) . .	4	8
" " " April, ...	5	8
" " " May, ...	5	12
" " " June, ...	6	0
" " " July, ...	6	0
" " " August, ...	5	12
Whole amount of butter in 18 days, . . .	33	8

Another cow, Devon and Durham, entered by William Eames, of Worcester, produced of butter:—

	lbs.	oz.
The first three days of March, ...	2	12
" " " April, ...	3	8
" " " May, ...	4	10
" " " June, ...	5	4
" " " July, ...	4	12
" " " August, ...	4	4
Whole amount of butter in 18 days, . . .	25	2

Neither of these competitors having complied with the conditions upon which these premiums were offered, from a misunderstanding of the terms of the same, the committee recommend a gratuity to William W. Watson, of $30, and to William Eames, of $20.

Mr. Salisbury, of Worcester, presented for exhibition, beautiful specimens of the Alderney stock, as well as a number of fine grade heifers, which gave proof of care and attention in rearing.

T. P. Huntington, *Chairman.*

REPORT OF THE COMMITTEE ON CLASS NO. 5.

There was but one cow kept for milk, entered in this Class for premium, and she was so superior that the committee had no hesitation in awarding to her owner, Mr. Rufus Carter, of Worcester, the first premium of $40.

There were two other animals entered for exhibition only, the conditions of the premium not having been complied with. One of these, a fine cow entered by T. P. Curtis, the other a beautiful heifer, entered by Mr. Charles Brigham, of Marlboro'. The committee respectfully recommend that a gratuity of $10 be allowed to Mr. Brigham, as some compensation for his trouble.

CHARLES L. FLINT, *Chairman.*

STATEMENT OF RUFUS CARTER.

Record of product of dairy stock, entered and exhibited for premium in Class 5, at the dairy stock exhibition, at Worcester.

Day of Month.		Yield of Milk after being Strained.				Product of Milk.			
		Weight.		Beer Measure.		Butter.		Cheese.	
		lbs.	oz.	qts.	pts.	lbs.	oz.	lbs.	oz.
March	1st, . .	12	8	–	–	–	–	–	–
	2d, . . .	6	–	–	–	–	–	–	–
	3d, . . .	–	–	–	–	–	–	–	–
April	1st, . .	–	–	–	–	–	–	–	–
	2d, . . .	–	–	–	–	–	–	–	–
	3d, . . .	–	–	–	–	–	–	–	–
May	1st, . .	39	12	14	1¼	–	–	–	–
	2d, . .	40	8	15	1	–	–	–	–
	3d, . .	40	–	16	–	–	–	–	–
June	1st, . .	61	8	24	1½	–	–	–	–
	2d, . . .	66	12	26	1¼	–	–	–	–
	3d, . . .	65	8	26	1	–	–	–	–
July	1st, . .	52	–	22	–	–	–	–	–
	2d, . . .	60	12	24	0¾	–	–	–	–
	3d, . . .	57	4	23	0¼	–	–	–	–
August	1st, . .	49	–	19	0¾	–	–	–	–
	2d, . . .	47	4	18	1¾	–	–	–	–
	3d, . . .	38	12	15	0½	–	–	–	–

Question 1.—What has been the exact amount of strained milk in weight and yielded by the cow entered by you, during the prescribed period of trial? to wit: For six months immediately preceding the first day of September, 1856. Please to specify the amount yielded on each day. See schedule annexed.

2. How many animals constitute your dairy, and has the cow entered by you been kept alone or with others? I have three cows. The one I enter has been kept alone most of the time while at pasture, and with the others while in the barn.

3. What is the age of the cow exhibited by you? Ten years next October.

4. Of what breed is she? One-fourth Ayrshire, three-fourths Durham.

5. Where was she raised and bred, and by whom? In Worcester, bred by Hon. Levi Lincoln, and raised by William S. Lincoln, Esq.

6. If imported, when and by whom was the importation made?

7. When was the animal last dried? I commenced drying her on the second day of March, and was obliged to milk her occasionally up to the twenty-eighth of March.

8. At what time did she drop her last calf? On the 28th day of April, 1856.

9. At what time will she next calve? She received bull on the 15th of August, 1856.

10. At what time was she turned to pasture? On the third day of May.

11. Through what period does your time of stabling extend? and what is your course of management, both as to food, drink, grooming and exercise, while your stock are stabled? My time of stabling extends from about the middle of November to the first of May, but my cows are kept in the barn a much longer time nights. While stabled they are fed regularly three times a day, and allowed to drink three times a day. Groomed daily. The cow I entered was kept tied up in the barn most of the time during last winter. She was exercised by driving her about one-fourth of a mile daily, for a few weeks before she calved.

12. What amount of food, and of what kind, other than hay, has been allowed to the cow entered by you while in the stable,

subsequent to December 1, 1855? 50 lbs. mangel wurzel per day, during the month of December; 40 lbs. of the same from January 1st to January 23d; then 36 lbs. carrots per day to February 21st; 4 quarts of shorts on the 22d day of February; 12 lbs. of carrots April 7th, and one peck of potatoes on the 24th day of April.

13. What amount, and what kind of food was allowed to her during the period of their being in pasture? While in the barn nights she was allowed to eat what hay she pleased, which averaged from four to five pounds per night.

14. In what class are you a competitor? Five.

NOTE.—In Classes Nos. 1, 2, 3, 4, all the milk must be manufactured into butter or cheese during the whole period of trial. In Class 5 the milk is not required to be manufactured.

In case of a misapprehension of the intention of the rules by any competitor at the commencement of his trial, the Trustees reserve to themselves the right of dating the commencement of the required trial at any day subsequent to the 1st of December, 1855, and previous to January 1, 1856.

RUFUS CARTER.

DECEMBER 1, 1855.

COMMONWEALTH OF MASSACHUSETTS.

WORCESTER, *ss.*, *September* 10, 1856. Then personally appeared the above named Rufus Carter, and made oath that the foregoing statements by him subscribed are true.

Before me, J. HENRY HILL, *Justice of the Peace.*

REPORT OF THE COMMITTEE ON DURHAMS.

There were no competitors for the premiums offered for Durham cows under Class No. 3, so that in reference to that class your committee had no duty to perform.

For the premiums offered for Durham bulls, under Class No. 6, there were five competitors.

Kirkleavington, entered by Paoli Lathrop, of South Hadley Falls, six years old the first of January last, we regard as a very superior animal, and a most excellent specimen of the Durham shorthorn breed.

We unhesitatingly recommend that the premium of $50, for

the best Durham bull, not less than one year old, be awarded to Mr. Lathrop.

In our opinion neither of the other bulls, entered as Durhams, were of pure blood. Their owners failed to furnish pedigrees, or any other evidence, except their own suppositions, to induce us to change that opinion.

The bull entered by Silas E. Brigham & Co., of Southborough, although probably not quite pure blooded Durham, is still a very good animal, and is worthy of commendation. We therefore recommend that a gratuity of $25 be awarded to them for their bull. The others were not only very far from being pure blood animals, but possessed no other qualities which deserve recommendation. Their owners undoubtedly believe what they say, but are very much mistaken.

For the Committee,

T. E. Payson, *Chairman.*

REPORT OF THE COMMITTEE ON DEVONS.

In the execution of their duties the committee have necessarily experienced some embarrassment, resulting not alone from the difficulties which occur in deciding on cases where the shades of difference are scarcely perceptible, but, in some degree, owing to the want, of what the committee deemed, proper evidence as to the purity of blood of the animals offered for premium. Acting under the rules prescribed by the trustees of the State Society, the committee felt bound to a rigid adherence to them, and that nothing but pure blood had any apology for the granting of a premium. Although there were animals presented that were very perfect in form, and as such manifested great excellence in breeding, and were individually almost perfect for the class under examination, yet the defect of a single link in the chain of their pedigree has placed them out of the reach of the society's liberal benefaction. Such they have felt compelled to pass by without further comment. There were others placed before them, of peculiar merit and beauty, but whose owners had not taken proper measures to bring within the regulations of the society. In the opinion of your committee, it is time

that all our agricultural societies should assert a claim to high excellence in all the grades of cattle, which they are called upon to approve and commend to the public, and though it may be the beginning of a new era in the progress of improvement in that direction, it cannot fail to produce great benefits to the interest of the farmer. Animals to which premiums are awarded by the State or County societies, should be acknowledged to have an equal merit with any others in the country; purchasers of blood stock should never be allowed room to doubt for a moment, that they have the purity of blood, and that duly proved, for which they have bargained. This point being settled, habits of accuracy will be introduced among all stock breeders, which will set at rest all doubt as to the origin and progress of every individual in the registry. Farmers will then be better able to decide which particular race of cattle is best adapted to his own locality, and may then proceed with a surer hope of success, in improving the character of his own particular choice. With these remarks, your committee would state, that, much to their regret, there were no cows, of the class to which their duty was confined, offered for the society's premium. Six very fine ones from the herd of William Buckminster, Esq., were offered for exhibition only, and attracted much attention.

Of bulls, there were eleven entered for premium, and two of much promise, owned by William Buckminster, for exhibition only. Of those entered for premiums, several were unfortunately debarred from competition for reasons before stated.

The committee have awarded premiums as follows, viz.:—

To Harvey Dodge, of Sutton, for his bull Duke of Devonshire, one year and four months old, the first premium of fifty dollars.

To John Brooks, Jr., of Princeton, for his bull, two years and three months old, the second premium, of forty dollars.

To Peter Harwood, of Barre, for his bull, two years and six months old, the third premium, of twenty-five dollars.

For the Committee,

SAMUEL CHANDLER, *Chairman.*

REPORT OF THE COMMITTEE ON AYRSHIRES.

The committee appointed by the Trustees of the Massachusetts Society for Promoting Agriculture, to award premiums for the State Show of Dairy Stock, in Nos. 3 and 6, embracing Ayrshire stock only, respectfully submit the following report:—

That the Ayrshire breed of animals have for more than half a century been in high repute in Scotland and other regions where they have been disseminated as a milking race, of hardy constitution, giving more milk of their inches than any other variety, and of a quality certainly equal to any imported to this country, save the Jerseys, and perhaps the Devons.

We believe that it is universally admitted that the county of Ayr and its vicinity, in Scotland, is the home of this breed. Whether they have been brought to their present perfection by judicious selections from the ancient race, or by crosses with other races that had properties they wished to ingraft into their own, is left to conjecture.

That the stock of that locality were originally poor milkers, mostly of black color, with "line backs" and white faces, is pretty certain. That the color now is almost invariably a dark red, chestnut or brown, interspersed more or less with white, and frequently with dark spots dotting the white surface, and instead of white being as formerly located uniformly over a herd, it is rare to find two speckled alike,* showing, as the committee think, that crosses, rather than improvements incident to high culture, have effected this striking change in color, and have had an influence in increasing their size, and it has attained one now as large as the generality of New England farms will perpetuate. If this is so, for dairy stock, they are large enough; for we are confident that any stock will be more productive when so kept that their properties shall be fully developed, than when stunted or suffered to degenerate.

* The foregoing remarks as to color are more particularly applicable to those imported by Mr. Randall, of this State, and Mr. Prentiss, of Albany, than to those imported by Mr. Cushing, of Watertown, and Mr. Brodie, of New York. These last had more white, but the white ground was dotted thick with red spots.

That the good milking properties of this breed are more uniform and certain than any other imported stock, save the Jerseys, we fully believe. And, notwithstanding the admitted productiveness of the Jersey cow, when every attention is paid to her wants, it may be doubted whether, for farm and dairy purposes, she should be preferred to the Ayrshire.

I have appended the following note, because, coming, as I think it does, from one whose preferences are in favor of the Durhams, it is a valuable commendation to the Ayrshire cow.*

There were nine bulls entered for premium in this Class.
Two by George M. Barrett, of Concord, 2 and 4 years old.
One by Leonard Hoar, of Lincoln, 3½ years years old.

* In the Library of Useful Knowledge, a standard work published in London, in 1834, the writer says: "As mere milkers, they, (the Ayrshires,) cannot compare with the long-established dairy cow, the short-horn. They yield as much milk in proportion to their size and food, but not in proportion to the room they occupy, and the increased trouble they give from being more numerous in order to require the requisite quantity of milk.

"They produce an unusual quantity of rich cream, but there was so much difficulty in procuring them so as to keep up the stock, and the price asked for them was often so great, that they were comparatively abandoned."

As to their fattening qualities, the same writer says: "They unite, perhaps, to a greater degree than any other breed, the supposed incompatible properties of yielding a great deal of milk and beef. It will be long, perhaps, before they will be favorites with the butcher, for the fifth quarter will not usually weigh well in them; their fat is mingled with the flesh, rather than separated in the form of tallow. Two circumstances, however, may partially account for their not being thought to succeed so well when grazed. They are not able to travel so far on the same keeping as the highland cattle, and from their great value as milkers, they are often kept until they are too old to fatten to advantage, or for the beef to become of the first quality."

If the laudable efforts made by the Massachusetts Society to introduce full blood dairy stock, should be seconded by county societies and individuals, by encouraging the keeping the various races pure, and insisting upon a full history of all prize animals, tracing back their pedigree, the farmer will soon have at his command, the means of comparing and ascertaining for himself the cross most desirable. And although it may be admitted that the first cross from pure stock may excel in some points, a further cross will produce a degenerate and uncertain progeny. Therefore the importance, if any one proposes to breed grades, of being certain of the purity of the parent stock upon one side; as almost universal experience has demonstrated that you are far more sure to breed a good animal from a full blood, crossed with a race having no affinity, than from half-bloods of the same race.

One by John Brooks, Jr., of Princeton, 3 years 10 months old.
One by Sylvester Phillips, of Hopkinton, 3 years 8 months old.
One by Luke Sweetser, of Amherst, 2 years 3 months old.
One by John W. Lincoln, of Worcester, 2 years 7 months old.
" " " " 2 " 3 " "
" " " " 1 " 7 " "

After a careful inspection of the animals, and an examination of the statements of the several competitors, as to age, treatment, rearing and keeping, and also pedigree as far as given, confirming purity of blood in this race, we recommend that the premiums offered by the trustees, on Ayrshire stock, be awarded as follows :—

First premium to William S. Lincoln, of Worcester, for his bull, Bruce, from McGregor and Swinley stock, $50.

Second premium to John Brooks, Jr., of Princeton, for his bull, bred by Daniel Webster, $40.

Third premium to William S. Lincoln, for his bull, Rob Roy, descended from the imported Ayrshire bull, Swinley, $25.

There were three cows entered for exhibition only, by William S. Lincoln, of Worcester. One ten years old, had run with a pair of twin calves the past summer; one three years old, had been in milk nearly a year; another five years old, now dry, a very promising cow, and all fine animals, with a pedigree which makes the purity of their blood undoubted. Their calves were also fine well bred animals.

Our attention was also called to some grade Ayrshires belonging to the Hon. John Brooks, of Princeton, from a cross of the State importation. They were a good lot of cows, reported to be good milkers, and had strong indications of Ayrshire blood. He had at the show, some fine heifer calves from these cows, by his Ayrshire bull.

MOSES NEWELL, *Chairman.*

REPORT OF THE COMMITTEE ON ALDERNEYS.

The committee appointed by the Trustees of the Massachusetts Society for Promoting Agriculture, on Jersey or Alderney, stock, under Classes No. 3 and No. 6, have attended to the duty assigned them, and ask leave to present the following report:—

For the premiums five bulls were offered, and three for exhibition by the Massachusetts Society. As the premiums extended to persons all over the Commonwealth, your committee regret that a larger number were not offered for their examination. The bulls presented were, however, all of them superior animals, and all worthy of premiums. After a full and thorough examination of each of the animals, and also the accompanying statements, signed and sworn to by the reputed owners, your committee make the following award:—

For the best Jersey bull, 1 year old, to William Spencer, of Lowell, ...	$50 00
For the 2d best, to Stephen Salisbury, of Worcester, .	40 00
For the 3d best, to Joseph Burnett, of Southborough, for his bull "Czar,"	25 00

The premiums offered under Class No. 3, were—

For the best Jersey or Alderney cow, ...	$50 00
For the next best, ...	35 00

Your committee are pained to report, that not a single entry for premium was made under this class. The premiums being quite liberal, your committee had every reason to suppose that a large number of the best breed of cows would have been offered for their inspection. As it is, their duties in this respect are ended, by this expression of their disappointment and regret.

But your committee had the satisfaction of viewing a herd of three Jersey cows, offered for exhibition by our enterprising and public spirited fellow-citizen, Hon. Stephen Salisbury, of Wor-

cester, to whose exertions the Massachusetts Society, as well as this community, are much indebted, for the importation of blood cattle, as well as for improvements in other departments of agriculture. These cows are a very fine specimen of the Jersey breed, and are named respectively, "Lady," "Judy," and "Fawn." They were imported by himself, in 1853, and would have been worthy of a premium, if he had complied with the society's requisitions in regard to the quantity of milk, butter, &c. Your committee recommend that the thanks of the Massachusetts Society be presented to Mr. Salisbury for his importation and exhibition of these cows.

A lot of cows and bulls were also entered by the Massachusetts Society, for exhibition and sale. They were imported, or were the progeny of imported stock, and are undoubtedly the finest collection of that breed of animals in this Commonwealth. That society deserves the high commendation of our people for importing that stock, and thus enabling all to judge of their qualities as milkers, and the utility of a cross with our native or other breeds.

Your committee recommend that the usual compensation be allowed to Joseph Burnett, of Southborough, for travel for his bull, "Rob Roy," for which no premium was given.

Respectfully submitted,

HENRY W. CUSHMAN, *Chairman.*

WORCESTER, September 24, 1856.

REPORT OF THE COMMITTEE ON NATIVE AND GRADE BULLS.

The committee on "Bulls of native or mixed breed," under Class No. 6, respectfully report, that the whole number of entries in their department was sixteen, as follows :—

No. 1. Moses Thompson, New Braintree, Worcester County, bull 3 years and 7 months old, three-fourths Durham and one-fourth Hereford.

No. 2. Henry Boyles, Princeton, Worcester County, bull 4 years and 6 months old, one-half Devon and one-half native.

No. 3. Nathan Danforth, Princeton, Worcester County, bull 1 year and 4 months old, Ayrshire and Durham.

No. 4. Asa G. Sheldon, Wilmington, Middlesex County, native bull, 4 years old.

No. 5. George E. Allen, Barre, Worcester County, bull one-half native, one-fourth Hereford, and one-fourth Durham, 1 year 6½ months old.

No. 6. Phineas A. Beaman, Princeton, Worcester County, bull 2 years and 4 months old, Durham and native.

No. 7. Daniel Dwight, Jr., Dudley, Worcester County, bull 15½ months old, Durham and Devon.

No. 8. Moses Smith, Hardwick, Worcester County, bull 3 years and 6 months old, one-half Durham, one-fourth Hereford, and one-fourth native.

No. 9. Taylor Stockwell, Sutton, Worcester County, bull 1 year and 6 months old, native.

No. 10. James Dewell, West Stockbridge, Berkshire County, bull 4 years old, Hereford and Durham.

No. 11. Aaron Gould, Douglas, Worcester County, bull 1 year and 5 months old, one-fourth Durham, one-fourth Devon, and one-half native.

No. 12. Francis Carroll, Grafton, Worcester County, bull 2 years and 7 months old, Durham and Ayrshire.

No. 13. Sewall Richardson, Princeton, Worcester County, bull 3 years and 6 months old, one-fourth Durham, one-fourth Devon, and one-half native.

No. 14. Aaron B. Rice, Marlboro', Middlesex County, bull 3 years and 5 months old, one-half Durham, one-fourth Ayrshire, and one-fourth native.

No. 15. Jepthah Conant, Stowe, Middlesex County, bull 2 years and 4 months old, one-eighth Durham and seven-eighths native.

No. 16. William Adams, Jr., West Brookfield, Worcester County, bull 2 years and 5 months old, native.

The breed of the bulls is given as set forth in the statements of the owners, but in several instances the animals indicated a mixture of other blood.

We award to Moses Thompson, of New Braintree, Worcester

County, for his Durham and Hereford bull, No. 1, the first premium, $50; to Daniel Dwight, Jr., of Dudley, Worcester County, for his Durham and Devon bull, No. 7, the second premium, $40; and to Francis Carroll, Grafton, Worcester County, for his Durham and Ayrshire bull, No. 12, the third premium, $25.

The committee were unanimous in awarding the first and second premiums, but were divided in opinion as to the third. Each of the sixteen bulls exhibited had some excellent points, and after those for which were awarded the first and second premiums, several possessed nearly equal merit. All of the bulls were worthy of exhibition, and the committee recommend the payment of twelve cents per mile to each of the owners whose bull was brought more than ten miles.

The committee express their surprise and regret that the very liberal premiums offered, did not bring to the exhibition animals in this class from a greater number of the counties.

Respectfully submitted, for the Committee,

J. H. W. Page, *Chairman.*

Worcester, September 25, 1856.

APPENDIX.

[A.]

PREMIUMS OFFERED FOR DAIRY STOCK.

CLASS I.

For the best six Dairy Cows, which shall have been owned and kept together from July 1, 1855, to the day of the show, and at least three of which cows shall have been bred and raised or imported by the competitors—

A first premium of	. . . . .	$250 00
second "	. . . . .	200 00
third "	. . . . .	150 00
fourth "	. . . . .	100 00

CLASS II.

For the best four Dairy Cows, owned and kept from July, 1, 1855, to the day of the show, at least *one* of which shall have been bred and raised or imported by the competitors—

A first premium of	. . . . .	$150 00
second "	. . . . .	100 00
third "	. . . . .	60 00
fourth "	. . . . .	40 00

Notice of intention to compete for either of the above premiums, must be given in person, or by letter, post paid, to Benjamin Guild, Esq., Secretary of the Society, at Boston, on or before the 1st day of December next. The period of trial will extend from December 1, 1855, to August 31, 1856, both inclusive.

CLASS III.

For the best Durham Cow,	. . . . .	$50 00
next best,	. . . . .	35 00

For the best Devon Cow, ...	$50 00
next best, ...	35 00
best Ayrshire Cow, ...	50 00
next best, ...	35 00
best Jersey or Alderney Cow, ...	50 00
next best, ...	35 00
best Cow of any other pure breed, . .	50 00
next best, ...	35 00

Premiums will not be awarded in this class unless the milk of the competing cow has been manufactured into butter or cheese, and an average daily yield of 1 lb. of butter, or 3 lbs. new milch cheese. weighed as ready for market, obtained therefrom for the period of six months preceding the 1st of September, 1856.

Regard will be had in making the awards, to the ages of the animals, the number of cows kept together, their food, and the consequent comparative expense of keeping, and their product.

CLASS IV.

For the best Cow of any breed, or mixture of breeds, (from a herd of not less than three cows,) which shall have been owned by the competitor from July 1, 1855, to the day of the show, kept for the manufacture of butter or cheese, for a period of six months, immediately preceding the 1st of September, 1856—

A first premium of	$50 00
second "	40 00
third "	30 00
fourth "	20 00

Premiums in this class will not be awarded unless there has been an average daily yield of 1 lb. of butter, or 3 lbs. new milch cheese, for the whole period of trial, weighed as ready for market.

CLASS V.

For the best Cow kept for Milk, and owned by the competitor from the 1st day of July, 1855, to the day of the show—

A premium of	$40 00
For the next best, ...	30 00
" "	20 00
" "	10 00

Premiums in this class will not be awarded unless there has been an average daily yield of 25 lbs. of milk for a period of six months immediately preceding the 1st day of September, 1856.

Competitors for all the above classes of premiums will be required to file with William S. Lincoln, Secretary of this Committee, on or before the 10th day of September, 1856, their statement in writing, under oath, or affirmation, to the following facts :—

The age and breed of the cow, the place where, and person by whom, bred and raised, or imported, the time of being dried last, and of last and of next calving;

The time of turning to pasture;

The whole number of cows constituting their dairy, and whether kept together;

Quantity of milk yielded by each competing cow, ascertained by the weight and beer measure of each milking after strained, for the first three days of each month of trial, and when the milk is manufactured, the amount of butter or of cheese yielded by the competing animals during the whole period as specified in each class. In Classes No. 1, No. 2, No. 3 and No. 4, all the milk must be manufactured into butter and cheese, during the whole period of trial. In Class No. 5 this is not required. In Classes No. 1 and No. 2, the milk of the competing cows may be manufactured together. In all cases the amount of butter and cheese produced by the milk of the three days must be ascertained. It will also be required that the statement shall give full and accurate account of the times of stabling, the method of management of the entire dairy during the period of stabling, the process of manufacture pursued, and the kind and quantity of every article of food furnished the animals, either while in the barn or at pasture, distinguishing between said periods.

CLASS VI.

For the best Durham Bull, not less than one year old, . . .	$50 00
second best, ...	40 00
third best, ...	25 00
best Devon Bull, not less than one year old, . . .	50 00
second best, ...	40 00
third best, ...	25 00
best Ayrshire Bull, not less than one year old, . . .	50 00
second best, ...	40 00
third best, ...	25 00
best Jersey or Alderney Bull, not less than one year old,	50 00
second best, ...	40 00
third best, ...	25 00
best Bull of native or mixed breed, not less than one year old,	50 00
second best, ...	40 00
third best, ...	25 00

A written statement, under oath, signed by the competitor under this class, must be filed with the Secretary of this Committee, at the time of entering the animal, giving the age, breed, place where raised, person by whom bred and raised, or imported, method of management and kind and quantity of any article of food furnished, other than hay or grass, subsequent to the 1st of March, 1856.

In all cases competitors must be the actual owners of the animals entered by them, on the 1st day of July, 1855, and such ownership must have continued to the day of the show.

Security will be required that every bull to which a premium is awarded, shall be kept within the State for twelve months succeeding the show.

No animal shall be allowed to enter into competition in more than one class.

All animals offered for competition must be entered with William S. Lincoln, the Secretary of this Committee, in Worcester, on or before Wednesday, the 24th day of September, at 12 o'clock at noon, and must be exhibited upon the grounds of the Worcester Agricultural Society, on the day of the exhibition, at 8 A. M., and remain till 3 P. M.

NAMES OF COMMITTEES TO AWARD THE ABOVE PREMIUMS.

On Classes Nos. 1 *and* 2.

Hon. Levi Lincoln, Worcester, *Chairman.*

Hon. Simon Brown, Concord,
Henry W. Clapp, Esq., Greenfield,
Paoli Lathrop, Esq., South Hadley,
Hon. Seth Sprague, Duxbury.

On Durham Stock, under Classes Nos. 3 *and* 6.

Thomas E. Payson, Esq., Rowley, *Chairman.*

George M. Barrett, Esq., Concord,
Charles P. Hitchcock, Esq., Hadley,
Pearly Truesdell, Esq., W. Stockbridge,
Dr. Eben Wight, Dedham.

On Devon Stock, under Classes Nos. 3 *and* 6.

Gen. Samuel Chandler, Lexington, *Chairman.*

Amos M. Carlton, Esq., Chicopee,
Hon. Alvah Crocker, Fitchburg,
James Poor, Esq., North Andover,
Hon. Benj. Rodman, New Bedford.

On Ayrshire Stock, under Classes Nos. 3 *and* 6.

Hon. Moses Newell, Newbury, *Chairman.*

David Lee, Esq., Barre,
S. W. Lincoln, Esq., Cheshire,
William Pynchon, Esq., Springfield,
Asa G. Sheldon, Esq., Wilmington.

On Jersey or Alderney Stock, under Classes Nos. 3 and 6.

Hon. Henry W. Cushman, Bernardston, *Chairman.*

Prof. William C. Fowler, Amherst,
John B. Moore, Esq., Concord,
Moses Stebbins, Esq., South Deerfield,
Aaron D. Weld, Esq., West Roxbury.

On Cows of any other pure breed than Durham, Devon, Ayrshire and Jersey or Alderney Stock, under Class No. 3.

Justus Tower, Esq., Lanesborough, *Chairman.*

Samuel Capen, Esq., Dorchester,
Horatio Sargeant, Esq., Springfield,
Luke Sweetser, Esq., Amherst,
Jonas Viles, Esq., Waltham.

On Class No. 4.

Theophilus P. Huntington, Esq., Northampton, *Chairman.*

Wm. Buckminster, Esq., Framingham,
Hon. Peter Lawson, Dracut,
Sidney Packard, Esq., E. Bridgewater,
Charles Pomeroy, Esq., Northfield.

On Class No. 5.

Charles L. Flint, Esq., Boston, *Chairman.*

William P. Dickinson, Esq., Hadley,
Josiah Fogg, Esq., Deerfield,
John Perkins, Esq., South Danvers,
Hon. Amasa Walker, North Brookfield.

On Bulls of native or mixed Stock, under Class No. 6.

Horace M. Sessions, Esq., Wilbraham, *Chairman.*

Hon. Charles Marston, Barnstable,
Hon. J. H. W. Page, Brookline,
George S. Willis, Esq., Pittsfield,
Richard P. Waters, Esq., Salem.

SALE OF DAIRY STOCK.

At 3 o'clock, P. M. of the day of the State Dairy Show, a sale by public auction will be made of the fine herd of Jersey or Alderney cows, imported and owned by the Massachusetts Society for Promoting Agriculture, and an arrangement will be made for an extensive sale of dairy stock belonging to farmers who may wish to avail themselves of this opportunity to dispose of, or to replenish their herds.

Robert C. Winthrop,
George W. Lyman,
James W. Paige,
Stephen Salisbury,
Wm. S. Lincoln,
Committee.

[B.]

Statement of the daily yield of the Cow entered for Premium by Mr. Rufus Carter, *of Worcester.*

Date.	Morning.	Noon.	Night.	Total.	Date.	Morning.	Noon.	Night.	Total.
1855.	lbs.	lbs.	lbs.	lbs.	**1855.**	lbs.	lbs.	lbs.	lbs.
June 2,	21¾	16	13	50¾	July 18,	20	11¾	11¾	43½
3,	24	14½	14¼	52¾	19,	19¼	10	9	38¼
4,	24	16¾	16	56¾	20,	20	12	10	42
5,	24	17	15¾	56¾	21,	18¼	12	9¼	39½
6,	24½	16¼	14¾	55½	22,	20¾	10¾	10	41½
7,	23	15¼	16¼	54½	23,	20	11¼	10½	41¾
8,	24¼	15¼	13	52½	24,	19¾	11	11¼	42
9,	24¼	15	14½	53¾	25,	20¼	10¾	10	41
10,	24	14½	14¾	53¼	26,	18¼	12¼	10¾	41½
11,	23¼	14¾	14	52	27,	19½	10¼	10¼	40
12,	23	16¾	15¼	55	28,	19	11¼	11¼	41½
13,	21½	16¼	14	51¾	29,	18¾	11¼	9	39
14,	23¼	15	14	52¼	30,	19	10¼	9½	38¾
15,	22¼	13¾	14½	50½	31,	20¾	10½	11	42¼
16,	23	15½	15¾	54¼	August 1,	19½	9¾	10	39¼
17,	23¾	14	14	51¾	2,	19¾	–	22¼	42
18,	22¾	15¼	14	51¾	3,	17¾	–	19¼	37
19,	22¾	16	15	53¾	4,	18¼	–	22	40¼
20,	22	16½	15	53½	5,	19	–	18¾	37¾
21,	24¼	15½	14½	54¼	6,	20¾	–	22	42¾
22,	22	15¾	14	51¾	7,	18¼	–	20	38¼
23,	24¼	14	13½	51¾	8,	19½	–	21	40½
24,	25½	13¼	12¾	51½	9,	21¾	–	21½	43¼
25,	23¼	16¼	14	53½	10,	20¾	–	21	41¾
26,	24¾	15	14	53¾	11,	20½	–	20¼	40¾
27,	23	17	14¼	54¼	12,	21	–	23	44
28,	22½	15½	14	52	13,	20	–	20¾	40¾
29,	23½	16¾	14¼	54¾	14,	19	–	21¾	40¾
30,	22½	14½	13	50	15,	19	–	19¼	38¼
July 1,	23	12¾	14¾	50½	16,	22½	–	22¾	45¼
2,	21	14½	13¼	48¾	17,	21½	–	22	43½
3,	24	14¼	13	51¼	18,	20½	–	22½	43
4,	23	14¾	13	50¾	19,	21½	–	21½	43
5,	23½	12¾	12½	48¾	20,	20½	–	22½	43
6,	22¼	13½	13¾	49½	21,	22¼	–	23	45¼
7,	22¼	13¾	11¾	47¾	22,	21¼	–	22¾	44
8,	23¾	12	12	47¾	23,	21¼	–	22	43¼
9,	21½	13¼	12¾	47½	24,	21½	–	21¼	42¾
10,	22	14½	13	47½	25,	20	–	20½	40½
11,	23½	12¼	12¼	48	26,	20½	–	20½	41
12,	21	12¼	12	45¼	27,	20½	–	20½	41
13,	20¾	12	12	44¾	28,	21¼	–	21	42¼
14,	20¼	12¾	12	45	29,	20¼	–	20¾	41
15,	22¼	11	11	44¼	30,	20¼	–	20	40¼
16,	20	13	12	45	31,	19	–	20¾	39¾
17,	21¼	11¾	11¾	44					

Statement—Continued.

Date.	Morning.	Night.	Total.	Date.	Morning.	Night.	Total.
1855.	lbs.	lbs.	lbs.	**1855.**	lbs.	lbs.	lbs.
Sept. 1, . .	20½	19¾	40¼	Oct. 20, . .	16	15¾	31¾
2, . .	20½	19¾	40¼	21, . .	16¼	15½	31¾
3, . .	21	20	41	22, . .	15¾	15¼	31
4, . .	19¾	19½	39¼	23, . .	16¼	15¼	31½
5, . .	19¾	19½	39¼	24, . .	16	15	31
6, . .	18½	19¾	38¼	25, . .	14¾	15¼	30
7, . .	19¾	17¾	37½	26, . .	16¼	15	31¼
8, . .	18¼	21	39¼	27, . .	16½	15¾	32¼
9, . .	20	19¼	39¼	28, . .	16	13¾	29¾
10, . .	18½	20	38½	29, . .	14½	13¾	28¼
11, . .	18¾	19¾	38½	30, . .	15¾	13¼	29
12, . .	18	20	38	31, . .	16¼	13½	29¾
13, . .	18¾	19	37¾	Nov. 1, . .	14½	13½	28
14, . .	18½	19¼	37¾	2, . .	15¾	13	28¾
15, . .	19¼	19½	38¾	3, . .	15¼	12	27¼
16, . .	20	19¼	39¼	4, . .	16¾	13	29¾
17, . .	18	17¼	35¼	5, . .	14	13	27
18, . .	18½	17¼	35¾	6, . .	14¾	13	27¾
19, . .	17	19½	36½	7, . .	16	13	29
20, . .	17¾	19½	37¼	8, . .	15½	12½	28
21, . .	18	18	36	9, . .	16½	13½	30
22, . .	17¼	16¾	34	10, . .	15	14	29
23, . .	17¾	17	34¾	11, . .	16½	13	29½
24, . .	17¼	17¾	35	12, . .	13¾	13	26¾
25, . .	16¾	16¾	33½	13, . .	14½	13½	28
26, . .	15¼	16½	31¾	14, . .	15¼	13¼	28½
27, . .	15	16	31	15, . .	14¾	13¾	28½
28, . .	15¾	15½	31¼	16, . .	14¾	12¼	27
29, . .	15½	16	31½	17, . .	15¼	13½	28¾
30, . .	16	15	31	18, . .	15¼	12½	27¾
Oct. 1, . .	15¼	15½	30¾	19, . .	14½	13½	28
2, . .	15	14¾	29¾	20, . .	15¾	13½	29¼
3, . .	13	14¾	27¾	21, . .	15	13½	28½
4, . .	14	13	27	22, . .	14¼	12¾	27
5, . .	15	14	29	23, . .	15¼	12½	27¾
6, . .	15	13¼	28¼	24, . .	14½	11	25½
7, . .	14½	13½	28	25, . .	14¼	11½	25¾
8, . .	15¾	16¼	32	26, . .	13¼	11¾	25
9, . .	16	15¼	31¼	27, . .	14	11¾	25¾
10, . .	16½	16¾	33¼	28, . .	14½	11¾	26¼
11, . .	17¼	16	33¼	29, . .	15¼	12	27¼
12, . .	17	16	33	30, . .	16	11½	27½
13, . .	17	15½	32½	Dec. 1, . .	15½	13	28½
14, . .	17½	14½	32	2, . .	15¾	12	27¾
15, . .	17¾	16	33¾	3, . .	16¼	13½	29¾
16, . .	16¾	16¼	33	4, . .	16¼	12	28¼
17, . .	17	15	32	5, . .	15¼	11	26¼
18, . .	17½	15	32½	6, . .	13¾	10	23¾
19, . .	16¾	16	32¾	7, . .	12½	9	21½

Statement—Continued.

Date.	Morning.	Night.	Total.	Date.	Morning.	Night.	Total.
1855.	lbs.	lbs.	lbs.	**1856.**	lbs.	lbs.	lbs.
Dec. 8, . .	11¾	9	20¾	Jan'y 20, . .	9½	6½	16
9, . .	12¼	8	20¼	21, . .	8¾	6¾	15½
10, . .	12½	9	21½	22, . .	8½	6	14½
11, . .	12½	9½	22	23, . .	8½	6½	15
12, . .	12	10	22	24, . .	9	7¼	16¼
13, . .	13¾	10	23¾	25, . .	8¾	7¼	16
14, . .	13¼	9	22¼	26, . .	8½	7½	16
15, . .	13	9¼	22¼	27, . .	9½	6¾	16¼
16, . .	13	8¾	21¾	28, . .	9	7¾	16¾
17, . .	12½	8¾	21¼	29, . .	9½	7½	17
18, . .	12	9	21	30, . .	9½	7¾	17¼
19, . .	12	8¾	20¾	31, . .	10	7¼	17¼
20, . .	12	8¾	20¾	Feb'y 1, . .	9¼	8	17¼
21, . .	12¼	8¾	21	2, . .	9	7¾	16¾
22, . .	12	8½	20½	3, . .	9½	6¾	16¼
23, . .	12¼	8	20¼	4, . .	9	7¼	16¼
24, . .	11½	8½	20	5, . .	9	7½	16½
25, . .	12	8¾	20¾	6, . .	9	7½	16½
26, . .	12¼	8½	20¾	7, . .	10	7¾	17¾
27, . .	11¾	9	20¾	8, . .	9¾	7¾	17½
28, . .	12	8¼	20¼	9, . .	9¼	8	17¼
29, . .	11¾	9	20¾	10, . .	9¾	7½	17¼
30, . .	12¼	8¼	20½	11, . .	9¼	8	17¼
31, . .	12½	9	21½	12, . .	9¾	7½	17¼
1856.				13, . .	9½	8	17½
Jan'y 1, . .	11¾	8¼	20	14, . .	9½	7¾	17¼
2, . .	11¾	8¼	20	15, . .	9¼	7½	16¾
3, . .	11¾	8	19¾	16, . .	9¾	8¼	18
4, . .	11¼	8½	19¾	17, . .	10	7½	17½
5, . .	10¾	8	18¾	18, . .	9¾	8	17¾
6, . .	11	7½	18½	19, . .	9½	7½	17
7, . .	10	7¼	17¼	20, . .	8¾	7½	16¼
8, . .	10	7¼	17¼	21, . .	8¾	7½	16¼
9, . .	10	7	17	22, . .	8½	7¼	15¾
10, . .	10¼	7¼	17½	23, . .	8	7½	15½
11, . .	9½	7¾	17¼	24, . .	8¼	7	15¼
12, . .	10¾	8	18¾	25, . .	8	7	15
13, . .	10¾	7	17¾	26, . .	7¾	7	14¾
14, . .	10½	7½	18	27, . .	7¾	6¾	14½
15, . .	9¾	7½	17¼	28, . .	7	6¼	13¼
16, . .	9¼	6¾	16	29, . .	6¾	5¾	12½
17, . .	8½	6¾	15¼	March 1, . .	6¼	6¼	12½
18, . .	9¼	6¾	16	2, . .	6	–	6
19, . .	9¼	6¾	16				

Statement—Continued.

Date.	Morning. Measure. Qts.	Morning. Measure. Pts.	Morning. Measure. Gills.	Morning. W't. Lbs.	Noon. Measure. Qts.	Noon. Measure. Pts.	Noon. Measure. Gills.	Noon. W't. Lbs.	Night. Measure. Qts.	Night. Measure. Pts.	Night. Measure. Gills.	Night. W't. Lbs.	Total Measure. Qts.	Total Measure. Pts.	Total Measure. Gills.	Total Weig't Lbs.
1856.																
May 1,	5	–	2	15½	4	1	3	12½	4	1	–	11¾	14	1	1	39¾
2,	7	–	2	19	4	–	1	11	4	–	1	10½	15	1	–	40½
3,	7	–	3	18½	4	–	1	10¼	4	1	–	11¼	16	–	–	40
4,	8	–	1	21	4	1	3	12¼	4	–	1	10½	17	–	1	43¾
5,	8	–	1	20¾	4	–	3	11	4	1	1	11¾	17	–	1	43
6,	8	1	2	22	4	1	2	12	5	–	1	12¾	18	1	1	46¾
7,	9	–	3	24	5	–	1	13	5	–	3	13½	19	1	3	50½
8,	9	–	1	23	5	–	1	13	5	1	–	14	19	1	2	50
9,	8	–	3	21¾	3	1	2	9½	5	–	–	12¾	17	–	1	44
10,	6	1	3	17½	4	–	3	9¾	4	1	1	11¾	15	1	3	39
11,	8	1	–	21¼	4	1	–	11½	4	–	3	11	17	–	3	43¾
12,	8	–	3	21¼	5	1	–	13¾	5	–	3	13½	18	1	2	48½
13,	8	1	3	22¼	5	1	–	14	5	–	2	13	19	–	1	49¼
14,	9	–	3	23¾	5	–	1	13	6	1	3	16¾	21	–	3	53½
15,	10	–	2	26	6	1	–	16¼	6	–	3	16	23	–	1	58¼
16,	10	–	3	26¼	6	1	–	16	6	1	2	17	23	1	1	59¼
17,	10	–	1	25¾	6	1	3	17	6	1	2	17	23	1	2	59¾
18,	10	–	3	26	5	1	3	14½	6	1	3	17	23	–	1	57½
19,	9	–	–	22¾	7	–	–	17½	7	–	1	17½	23	–	1	57¾
20,	10	1	–	26¼	6	1	2	17	6	1	3	17	24	–	1	60¼
21,	10	–	3	26	7	–	2	17½	7	–	2	17¾	24	1	1	61¼
22,	10	–	1	25¾	7	1	1	19¼	6	1	3	17	24	1	1	62
23,	7	1	–	19	10	–	–	25	7	–	2	17¾	24	1	2	61¾
24,	11	–	–	27¼	7	1	1	19	7	–	1	17¼	25	1	1	63½
25,	10	–	1	25¾	7	–	1	17½	6	–	–	14¾	23	–	2	58
26,	9	1	–	24	7	–	–	17¼	6	1	–	16	23	–	–	57¼
27,	10	–	–	25½	6	1	2	16½	6	1	1	16	23	–	3	58
28,	11	–	2	28¼	7	–	–	17¼	6	1	–	16	24	1	2	61½
29,	9	1	1	24¼	7	1	2	19½	6	1	2	16¾	24	–	1	60½
30,	10	1	–	26¼	7	1	1	19	6	1	2	16¾	24	1	3	62
31,	10	1	2	27¼	7	–	2	18	6	1	1	17	24	1	1	62
													656 qts.			1,652
June 1,	10	1	2	27	7	–	1	17½	6	1	3	17	24	1	2	61½
2,	11	1	1	29¼	7	–	3	18½	7	1	1	19	26	1	1	66¾
3,	10	1	3	27½	7	1	3	19½	7	1	2	18½	26	1	–	65½
4,	11	–	2	28	7	1	1	19¼	7	1	–	19	26	–	3	66¼
5,	8	1	2	22¼	7	1	2	19½	6	1	1	16½	23	–	1	58¼
6,	9	1	–	24	7	1	–	18¾	6	–	3	15¾	23	–	3	58½
7,	11	–	2	28¼	6	1	2	17	6	–	3	15½	24	–	3	60¾
8,	11	–	–	27¼	7	–	2	18¼	5	1	–	13¾	23	1	2	59½
9,	10	–	2	26	7	–	1	18	6	1	2	17	24	–	1	61
10,	10	1	2	26¾	6	1	3	17¼	7	–	1	17¾	24	1	2	61¾
11,	10	–	–	25¾	7	1	1	19	7	–	2	18	24	1	3	62¾
12,	10	1	3	27	7	–	3	18½	6	1	1	16½	24	1	3	62
13,	10	–	3	26¼	7	–	3	18½	7	1	–	18¾	25	–	2	63¼
14,	11	–	–	28	7	–	2	18¼	7	–	1	18	25	1	1	64½

Statement—Continued.

Date.	Morning. Measure. Qts.	Morning. Measure. Pts.	Morning. Measure. Gills.	Morning. W't. Lbs.	Noon. Measure. Qts.	Noon. Measure. Pts.	Noon. Measure. Gills.	Noon. W't. Lbs.	Night. Measure. Qts.	Night. Measure. Pts.	Night. Measure. Gills.	Night. W't. Lbs.	Total Measure. Qts.	Total Measure. Pts.	Total Measure. Gills.	Total Weig't Lbs.
1856.																
June 15,	11	1	1	29¼	6	1	1	16¾	6	1	–	16½	24	1	2	62½
16,	10	1	1	27¼	7	–	2	18½	7	–	1	18¾	25	–	2	64½
17,	10	1	1	27	7	–	3	18½	7	1	–	18½	25	1	–	64
18,	10	–	2	26	7	–	2	18	8	–	–	20	25	1	–	64
19,	10	1	2	27½	7	1	1	19½	6	1	–	16½	24	1	3	63½
20,	11	–	–	27¾	8	–	1	20¾	7	1	3	20	27	–	–	68½
21,	9	1	3	25½	8	1	1	21½	7	1	2	19½	26	–	2	66½
22,	10	–	2	26	8	–	–	20¼	7	–	–	17½	25	–	2	63¾
23,	11	–	2	28¼	7	1	–	19	7	–	–	17½	25	1	2	64¾
24,	11	–	2	28¼	7	1	–	19½	7	–	2	18¼	26	–	1	66
25,	10	–	–	26¼	8	–	1	20¾	7	1	2	19¼	25	1	3	66
26,	11	–	3	28½	7	1	–	19¼	6	1	–	16½	25	–	3	64¼
27,	10	1	3	27½	7	1	–	18¾	6	–	–	15¼	24	–	3	61¼
28,	11	–	3	28¾	7	–	–	17¾	8	–	1	20¼	26	1	–	66¾
29,	10	–	–	24¾	7	–	1	17¾	7	1	–	28¾	24	1	1	61¼
30,	9	–	2	23¼	7	–	–	17½	7	–	–	17½	23	–	2	58¼
													754 qts.			1,898
July 1,	8	–	2	18	7	–	2	18	6	1	–	16	22	–	–	52
2,	10	–	1	25¼	7	–	2	18	7	–	–	17½	24	–	3	60¾
3,	9	1	2	24¼	7	–	–	17¼	6	–	3	15¾	23	–	1	57¼
4,	8	1	2	22	7	1	1	19	6	–	3	16	22	1	2	57
5,	10	1	2	27	6	1	–	16	6	–	–	15¼	23	–	2	58¼
6,	10	1	2	27	6	–	–	15	5	1	2	14¾	22	1	–	56¾
7,	9	–	–	22¾	7	1	1	19	6	1	2	16½	23	–	3	58¼
8,	9	1	–	23¾	6	1	2	16½	6	1	–	16¼	22	1	2	56½
9,	10	–	3	26¼	5	–	–	12¾	6	1	2	16½	22	–	1	55½
10,	9	–	1	23¼	5	–	2	13	7	–	2	18	21	1	1	54¼
11,	10	–	–	25	5	1	1	14	6	–	–	15	21	1	1	54
12,	8	1	–	21¾	6	1	–	16¼	5	1	–	14	20	1	–	52
13,	9	–	–	22¾	5	1	3	14¾	3	1	2	9	18	1	–	56
14,	9	–	1	23¼	6	1	2	17	5	1	1	14	21	1	–	54¼
15,	8	1	2	21¼	6	–	–	15	6	1	–	16¼	21	–	2	52½
16,	8	–	1	20½	4	1	3	12	7	–	3	18¼	20	–	3	50¾
17,	8	1	3	22¼	5	1	2	14½	6	–	–	15	20	1	1	51¾
18,	8	1	–	21¾	4	1	1	11¾	6	–	2	15½	19	–	3	49
19,	6	1	2	17	6	–	1	15½	6	–	–	15	18	1	3	47½
20,	9	–	–	22¾	4	1	2	12	6	1	2	17	20	1	–	51¾
21,	9	1	2	24½	5	1	1	14¼	6	–	3	16¼	21	1	2	55
22,	10	–	1	25½	5	1	–	14½	6	–	3	16	22	–	–	55½
23,	9	–	2	23¼	6	–	2	15½	7	–	–	17¾	22	1	–	56½
24,	9	1	2	24½	5	1	–	13¾	6	–	1	15½	21	–	3	53¾
25,	9	–	2	23½	5	1	1	14	6	–	–	15	20	1	3	52½
26,	9	–	–	22¾	5	1	2	14¼	6	1	–	16¼	21	–	2	53¼
27,	10	–	2	25½	4	1	2	11½	5	1	–	14	20	–	3	51
28,	8	–	2	21	5	1	2	14½	6	–	3	16	20	1	–	51½
29,	9	–	1	23	5	1	3	14¾	4	–	2	10½	19	–	2	47¼

Statement—Continued.

Date.	Morning. Measure. Qts.	Morning. Measure. Pts.	Morning. Measure. Gills.	Morning. W't. Lbs.	Noon. Measure. Qts.	Noon. Measure. Pts.	Noon. Measure. Gills.	Noon. W't. Lbs.	Night. Measure. Qts.	Night. Measure. Pts.	Night. Measure. Gills.	Night. W't. Lbs.	Total Measure. Qts.	Total Measure. Pts.	Total Measure. Gills.	Total Weig't Lbs.
1856.																
July 30,	8	–	–	20¼	7	–	1	17¼	5	1	–	13¾	20	1	1	51¼
31,	8	1	2	21¾	5	–	3	13¼	5	–	–	12¼	19	–	1	47¼
													660 qts.			1,660
Aug. 1,	9	–	2	23¾	4	1	–	11¼	5	1	1	14	19	–	3	49
2,	8	–	1	20½	5	–	2	13¾	5	1	–	13½	18	1	3	47¼
3,	8	1	3	22¼	4	–	2	11¼	2	–	1	5¼	15	–	2	38¾
4,	8	1	1	21½	4	1	1	11½	5	1	–	13½	18	1	2	46¼
5,	7	1	1	19½	4	–	3	10¾	5	1	1	14	17	1	1	44¼
6,	8	–	3	21	4	–	3	10¾	5	–	2	12¾	18	–	–	44½
7,	8	–	3	21	4	1	1	11½	5	–	3	13½	18	–	3	46
8,	8	–	1	20½	4	1	1	11½	4	1	2	12¼	17	1	–	44¼
9,	8	1	–	21½	4	1	2	12¼	5	–	1	12½	18	–	3	46¼
10,	8	1	–	21½	4	–	2	10¾	5	–	2	13¼	18	–	–	45½
11,	8	1	1	21¾	5	–	2	13¼	5	–	1	13	19	–	–	48
12,	8	1	2	22	4	1	2	11¾	5	1	1	14	19	–	1	47¾
13,	8	–	3	21¼	5	–	–	12¼	5	1	2	14½	19	–	1	48
14,	9	–	2	23¼	4	1	2	12	3	–	1	8	17	–	1	43¼
15,	9	1	3	25¼	5	–	1	12¼	5	–	2	13	20	–	1	50½
16,	8	1	2	22¼	5	–	2	13	5	1	2	14¼	19	1	2	50½
17,	9	–	2	23¾	4	1	2	11¾	5	1	–	13¾	19	1	–	49¼
18,	9	–	1	23	5	–	1	12½	5	1	3	14¾	20	–	1	50¼
19,	9	–	–	23	5	–	–	12½	5	1	–	13½	19	1	–	49
20,	9	–	–	23	5	–	2	13	4	1	3	12	19	–	1	48
21,	8	1	2	22	4	1	3	12¼	5	1	1	14¼	18	–	2	48½
22,	8	1	2	22	4	1	2	12	5	–	1	12¾	18	1	1	46¾
23,	9	–	1	23¼	5	–	1	13	5	1	2	14¼	20	–	–	50½
24,	9	–	1	23¼	5	–	3	13¼	5	1	–	14	20	–	–	50½
25,	9	–	2	23¼	4	1	3	12¼	5	–	–	12¾	19	–	1	48¼
26,	9	–	2	23¾	5	–	2	13	5	1	1	14¼	20	–	1	51
27,	8	1	3	22¼	5	–	1	13	5	–	3	13	19	–	3	48¼
28,	9	–	1	23	4	1	3	12¼	5	1	–	13½	19	1	–	48¾
29,	8	–	2	20¾	5	–	1	13	4	1	3	12¼	18	–	2	46
30,	8	1	–	21¼	5	–	2	13	4	1	2	12	18	1	–	46¼
31,	8	1	3	22¼	4	1	2	11¼	5	–	1	12	18	1	1	46½
													583 qts.			1,467
Sept. 1,	8	–	2	20½	–	–	–	–	9	1	2	24½	18	–	–	45
2,	8	–	2	20½	–	–	–	–	9	–	–	22½	17	–	2	43
3,	8	1	2	22	–	–	–	–	8	–	1	20½	16	1	3	42½
4,	8	–	1	20¼	–	–	–	–	9	–	1	23	17	–	2	43¼
5,	8	1	–	21¾	–	–	–	–	9	–	–	22½	17	1	–	44¼
6,	8	1	3	22¼	–	–	–	–	9	–	1	23	18	–	–	45¼
7,	8	1	3	22¼	–	–	–	–	8	–	1	20½	17	–	–	42¾
8,	7	1	2	19½	–	–	–	–	8	1	–	21¼	16	–	2	40¾
9,	7	1	1	19	–	–	–	–	9	–	–	22½	16	1	1	41½
10,	7	1	2	19¼	–	–	–	–	8	1	1	21½	16	–	3	40¾

RECAPITULATION.

	Quarts.	Lbs.
May,	656	1,652
June,	754	1,898
July,	660	1,660
August,	583	1,467
	2,653	6,677
Average daily yield for four months, is	$21\frac{79}{123}$	$54\frac{25}{123}$

[C.]

PREMIUMS AWARDED.

CLASS NO. 1.

Samuel Ellsworth, Barre,	1st premium,	$250, and travel.
Asa G. Sheldon, Wilmington,	2d premium,	$200, and travel.
William Robinson, Jr., Barre,	3d premium,	$150, and travel.

CLASS NO. 2.

Amos F. Knight, West Boylston,	1st premium,	$150 00
William Robinson, Jr., Barre,	2d premium,	100 00
John Mann, Jr., Worcester,	Gratuity,	25 00

CLASS NO. 4.

William W. Watson, Princeton,	Gratuity,	$30, and travel.
William Eames, Worcester,	Gratuity,	$20 00

CLASS NO. 5.

Rufus Carter, Worcester,	1st premium,	$40 00
Charles Brigham, Marlborough,	Gratuity,	$10, and travel.

CLASS NO. 6.

DURHAMS.

Paoli Lathrop, South Hadley,	1st premium,	$50, and travel.
Silas E. Brigham & Co., Southborough,	Gratuity,	$25, and travel.

DEVONS.

Harvey Dodge, Sutton,	1st premium,	$50, and travel.
John Brooks, Jr., Princeton,	2d premium,	$40, and travel.
Peter Harwood, Barre,	3d premium,	$25, and travel.

AYRSHIRES.

William S. Lincoln, Worcester,	1st premium,	$50 00
John Brooks, Jr., Princeton,	2d premium,	40 00
William S. Lincoln, Worcester,	3d premium,	25 00

JERSEYS.

William Spencer, Lowell,	1st premium,	$50, and travel.
Stephen Salisbury, Worcester,	2d premium,	$40 00
Joseph Burnett, Southborough,	3d premium,	$25, and travel.

MIXED BLOOD.

Moses Thompson, New Braintree,	1st premium,	$50, and travel.
Daniel Dwight, Jr., Dudley,	2d premium,	$40, and travel.
Francis Carroll, Grafton,	3d premium,	$25, and travel.
Henry Boyles, Princeton,		Gratuity of travel.
Nathan Danforth, Princeton,		Gratuity of travel.
Asa G. Sheldon, Wilmington,		Gratuity of travel.
George E. Allen, Barre,		Gratuity of travel.
Phineas A. Beaman, Princeton,		Gratuity of travel.
Moses Smith, Barre,		Gratuity of travel.
Tyler Stockwell, Sutton,		Gratuity of travel.
James Dewell, West Stockbridge,		Gratuity of travel.
Aaron Gould, Douglas,		Gratuity of travel.
Sewall Richardson, Princeton,		Gratuity of travel.
Aaron B. Rice, Marlborough,		Gratuity of travel.
Jeptha W. Conant, Stowe,		Gratuity of travel.
William Adams, Jr., West Brookfield,		Gratuity of travel.

[D.]

PRIZES FOR MOWING MACHINES.

The Trustees of the Massachusetts Society for Promoting Agriculture, believing that the introduction of labor-saving machines in field operations, especially those employed in mowing, promises to effect a most beneficial change in the agricultural economy of New England, are desirous of bringing this subject to the earnest and immediate attention of the farmers of Massachusetts. For the purpose of forwarding the movement now being made in this direction, they offer the following premium :—

To the possessor of the mowing machine which shall cut during the present season, with the greatest economy and to the best advantage, not less that fifty acres of grass within the State, the machine to be worked by horse or ox power, SIX HUNDRED DOLLARS.

All other things being equal, the greatest number of acres cut by any one machine exceeding fifty, would entitle the competitor to the premium.

Every competitor must give notice to the Trustees of his intention to compete for the premium, on or before the seventeenth of June next. He must, at the end of the season or before the tenth day of September next, furnish satisfactory proof of the number of acres cut by the machine during the season. He must also keep a record of each day's work; the number of hours actually at work in each day; the number and kind of animals employed, stating when any of the same, if any, are changed, and the reason therefor; the name of the maker of the machine; its cost; if new this season; any accidents or breakages which have occurred in working it, and the nature of them and how repaired, together with any suggestions which may seem useful in preventing a recurrence of them; which record shall be submitted to the Trustees at the close of the working season of the machine.

Competitors are not precluded from competing for any similar premiums offered by county societies or individuals, nor are they confined to mowing on their own land. It is also to be understood, that all persons, procurers of a machine, whether as owner, lessor or maker, resident of the State or otherwise, are entitled to compete for this premium.

The Trustees reserve the right of dividing the premium among equal claimants or of withholding it altogether, provided they are of opinion that no competitor has by his performance with his mowing machine made so great a saving in labor and expense over the old method of scythe mowing as to enable them to recommend its general introduction and use, in which case, the premium will be renewed for the succeeding year's competition.

As a further incentive to the skill and ingenuity of the manufacturers of mowing machines, the Trustees offer another premium of ONE THOUSAND DOLLARS to the maker and exhibitor of the best mowing machine, to be awarded in the year 1856.

To entitle any person to the premium, the machine, with full particulars of its principles of construction, weight and selling price, must be entered for competition with the Trustees on or before the

first day of June, 1856. A general trial will be had of all the competing machines, due notice of which will be given, together with all needful particulars, at the commencement of the season of 1856.

It is to be hoped that there will be a large competition for the premium offered this year, and that manufacturers who propose to compete for the one in 1856 will take pains to introduce their machines for this season's work. The Trustees in awarding the *one thousand dollar* premium will not confine themselves to the single trial which will be afforded to competitors to exhibit the powers of their machines, but they will also take into account the merits of each as displayed in competing for this year's premium, and in its ordinary working both for this and the coming year, whenever and wherever an opportunity is afforded of seeing it in operation.

The county agricultural societies are earnestly invited to appoint committees to aid the Trustees in awarding the prize offered for this year, who shall inspect the working of competing machines in their several districts, and in reporting the result of their observations to the trustees. One or more of the Trustees will endeavor to visit each county during the season, to see some portion of the work performed by each machine, but from the necessity of the case, great reliance must be had upon the cordial and hearty co-operation of the county societies.

The Trustees have appointed the following Committee to attend to the details connected with the subject, viz.:—Thos. Motley, Jr., G. W. Lyman, C. G. Loring, Richard S. Fay, W. S. Lincoln.

All communications may be addressed to Thomas Motley, Jr., Jamaica Plain, or Richard S. Fay, Boston.

Boston, May 28, 1855.

[D.]

MANAGEMENT OF DAIRY CATTLE.

BY T. HORSFALL.

On entering upon a description of my treatment of cows for dairy purposes, it seems pertinent that I should give some explanation of the motives and considerations which influence my conduct in this branch of my farm operations.

I have found it stated, on authority deserving attention, that store cattle of a fair size, and without other occupation, maintain their weight and condition for a length of time, when supplied daily with 120 lbs. of Swedish turnips and a small portion of straw. The experience of the district of Craven, in Yorkshire, where meadow hay * is the staple food during winter, shows that such cattle maintain their condition on one and one-half stone of meadow hay each per day. These respective quantities of turnips and of hay correspond very closely in their nutritive properties; they contain a very similar amount of albuminous matter, starch, sugar, &c., and also of phosphoric acid. Of oil—an important element, especially for the purpose of which I am treating—the stated supply of meadow hay contains more than that of turnips. If we supply cows in milk of average size with the kind and quantity of food above mentioned, they will lose perceptibly in condition. This is easily explained when we find their milk rich in substances which serve for their support when in store condition, and which are shown to be diverted in the secretion of milk.

In the neighborhood of towns where the dairy produce is disposed of in new milk, and where the aim of dairymen is to produce the greatest quantity, too frequently with but little regard to quality, it is their common practice to purchase incalving cows; they pay great attention to the condition of the cow; they will tell you, by the high comparative price they pay for animals well stored with flesh and fat, that condition is as valuable for them as it is for the butcher; they look upon these stores as materials which serve their purpose; they supply food more adapted to induce quantity than quality, and pay but little regard to the maintenance of the condition of the animal. With such treatment, the cow loses in condition during the process of milking, and when no longer profitable, is sold to purchasers in farming districts where food is cheaper, to be fattened or otherwise replenished for the use of the dairy keeper. We thus find a disposition in the cow to apply the aliment of her food to her milk, rather than to lay on flesh or fat; for not only are the elements of her food diverted to this purpose, but to all appearance her accumulated stores of flesh and fat are drawn upon, and converted into components of milk, cheese, or butter.

As I am differently circumstanced, a considerable portion of my dairy produce being intended for butter, for which poor milk is not

* Meadow hay, as understood in England, is the best quality of hay for nutritive purposes. A stone weight is eight pounds.—R. S. F.

adapted, and as I fatten not only my own cows, but purchase others to fatten in addition, I have endeavored to devise food for my milch cows, adapted to their maintenance and improvement, and with this view I have paid attention to the composition of milk. From several analyses I have selected one by Haidlen, which I find in publications of repute. Taking a full yield of milk, four gallons per day, which will weigh upwards of 40 pounds, this analysis assigns to it of dry material 5.20, of which the proportion, with sufficient accuracy for my purpose, consists of—

Pure casein,	2.00	pounds.
Butter,	1.25	"
Sugar,	1.75	"
Phosphate of lime, Chloride of potassium	.09	"
And other mineral ingredients,	.11	"
	5.20	"

It appeared an object of importance, and one which called for my particular attention, to afford an ample supply of the elements of food suited to the maintenance and likewise to the produce of the animal, and that, if I omitted to effect this, the result would be imperfect and unsatisfactory. By the use of ordinary farm produce only, I could not hope to accomplish my purpose. Turnips are objectionable on account of their flavor; and I seek to avoid them as food for dairy purposes. I use cabbages, kohl rabi, and mangold wurzel, yet only in moderate quantities. Of meadow hay it would require, beyond the amount necessary for the maintenance of the cow, an addition of fully 20 lbs. for the supply of casein in a full yield of milk (16 quarts); 40 pounds for the supply of oil for the butter; whilst 9 pounds seem adequate for that of the phosphoric acid. You cannot, then, induce a cow to consume the quantity of hay requisite for her maintenance, and for a full yield of milk of the quality instanced. Though it is a subject of controversy whether butter is wholly derived from vegetable oil, yet the peculiar adaptation of this oil to the purpose will, I think, be admitted. I had, therefore, to seek assistance from what are usually termed artificial feeding substances, and to select such as are rich in albumen, oil, and phosphoric acid; and I was bound also to pay regard to their comparative cost, with a view to profit, which, when farming is followed as a business, is a necessary, and in any circumstances an agreeable accompaniment.

I think it will be found that substances peculiarly rich in nitrogenous

or other elements have a higher value for special than for general purposes; and that the employment of materials characterized by peculiar properties for the attainment of special objects has not yet gained the attention to which it is entitled.

I have omitted all reference to the heat-supplying elements—starch, sugar, &c. As the materials commonly used as food for cattle contain sufficient of these to effect this object, under exposure to some degree of cold, I have a right to calculate on a less consumption of them as fuel, and consequently a greater surplus for deposit as sugar, and probably also as fat, in consequence of my stalls being kept during winter at a temperature of nearly 60 degrees.

I now proceed to describe the means I am using to carry out the purposes which I have sought to explain. My food for milch cows, after having undergone various modifications, has for two seasons consisted of rape-cake 5 pounds, and bran 2 pounds for each cow, mixed with a sufficient quantity of bean-straw, oat-straw, and shells of oats, in equal proportions, to supply them three times a day with as much as they will eat. The whole of the materials are moistened and blended together, and after being well steamed, are given to the animals in a warm state. The attendant is allowed 1 pound to 1½ pound per cow, according to circumstances, of bean-meal, which he is charged to give to each cow in proportion to the yield of milk, those in full milk getting 2 pounds each per day, others but little: it is dry and mixed with the steam food on its being dealt out separately; when this is eaten up, green food is given, consisting of cabbages, from October to December, kohl rabi till February, and mangold till grass time. With a view to nicety of flavor, I limit the supply of green food to 30 to 35 pounds per day for each. After each feed, 4 pounds of meadow hay, or 12 pounds per day, is given to each cow; they are allowed water twice per day to the extent they will drink.

As several of these materials are not commonly used as food, I may be allowed some observations on their properties. Bean-straw uncooked, is dry and unpalatable; by the process of steaming, it becomes soft and pulpy, emits an agreeable odor, and imparts flavor and relish to the mess. For my information and guidance I obtained an analysis of bean-straw of my own growth, on strong and high-conditioned land: it was cut on the short side of ripeness, but yielding a plump bean. The analysis by Professor Way shows a percentage of—

Moisture,	14.47
Albuminous matter,	16.38
Oil or fatty matter,	2.23
Woody fibre,	25.84
Starch, gum, &c.,	31.63
Mineral matters,	9.45
Total,	100.00

In albuminous matter, which is especially valuable for milch cows, it has nearly double the proportion contained in meadow hay. Bran also undergoes a great improvement in its flavor by steaming, and it is probably improved in its convertibility as food; it contains about 14 per cent. of albumen, and is peculiarly rich in phosphoric acid, nearly 3 per cent. of its whole substance being of this material. The properties of rape-cake are well known; the published analyses give it a large proportion (nearly 30 per cent.) of albumen; it is rich in phosphates and also in oil. This is of the unctuous class of vegetable oils, and it is to this property that I call particular attention. Chemistry will assign to this material, which has hitherto been comparatively neglected for feeding, a first place for the purpose of which I am treating. If objection should occur on account of its flavor, I have no difficulty in stating that by the preparation I have described I have quite overcome this. I can easily persuade my cattle, (of which sixty to eighty pass through my stalls in a year,) without exception, to eat the requisite quantity. Nor is the flavor of the cake in the least perceptible in the milk or butter.

During May, my cows are turned out on a rich pasture near the homestead,; towards evening they are again housed for the night, when they are supplied with a mess of the steamed mixture and a little hay each morning and evening. During June, when the grasses are better grown, mown grass is given to them instead of hay, and they are also allowed two feeds of steamed mixture. This treatment is continued till October, when they are again wholly housed.

The results which I now proceed to relate are derived from observations made with the view of enabling me to understand and regulate my own proceedings.

Gain or Loss of Condition ascertained by Weighing Cattle periodically.

For some years back I have regularly weighed my feeding stock, a practice from which I am enabled to ascertain their doings with greater accuracy than I could previously. In January, 1854, I commenced

weighing my milch cows; it has been shown by what I have premised that no accurate estimate can be formed of the effect of the food on the production of milk, without ascertaining its effect on the condition of the cows. I have continued the practice once a month almost without omission up to this date. The weighings take place early in the morning, and before the cows are supplied with food; the weights are registered, and the length of time (fifteen months) during which I have observed this practice, enables me to speak with confidence of the results.

The cows in full milk yielding 12 to 16 quarts each per day vary but little—some losing, others gaining, slightly; the balance in the month's weighing of this class being rather to gain. It is common for a cow to continue a yield from six to eight months before she gives below 12 quarts per day, at which time she has usually, if not invariably, gained weight.

The cows giving less than 12 quarts, and down to 5 quarts per day, are found, when free from ailment, to gain without exception. This gain, with an average yield of nearly 8 quarts per day, is at the rate 7 pounds to 8 pounds per week each.

My cows in calf I weigh only in the incipient stages, but they gain perceptibly in condition, and consequently in value: they are milked till within four to five weeks previous to calving. I give the weights of three of these, and also of one heifer, which calved in March, 1855:—

No		1854.				1855.				Gain.
			cwt.	qr.	lbs.		cwt.	qr.	lbs.	lbs.
1	Bought and weighed, .	July,	10	1	20	April,	11	3	0	148
2	" "	"	8	2	10	"	10	2	0	214
3	" "	"	8	2	0	"	10	0	0	184
4	Heifer, which calved also in March, 1855, weighed,	"	7	0	0	"	9	3	0	300

These observations extend over lengthened periods on the same animals, of from 30 to upwards of 50 weeks; a cow, free from calf and intended for fattening, continues to give milk from 10 months to a year after calving, and is then in a forward state of fatness, requiring but a few weeks to finish her for sale to the butchers.

It will thus appear that my endeavors to provide food adapted to

the maintenance and improvement of my milch cows have been attended with success.

On examining the composition of the ordinary food which I have described, straw, roots, and hay, it appears to contain the nutritive properties which are found adequate to the maintenance of the animal, whereas the yield of milk has to be provided for by a supply of extra food; the rape-cake, bran, and bean-meal which I give will supply the albumen for the casein; it is somewhat deficient in oil for the butter, whilst it will supply in excess the phosphate of lime for a full yield of milk. If I take the class of cows giving less than 12 quarts per day, and taking also into account a gain of flesh, 7 to 9 pounds per week, though I reduce the quantity of extra food by giving less of the bean-meal, yet the supply will be more in proportion than with a full yield; the surplus of nitrogen and phosphoric acid, or phosphate of lime, will go to enrich the manure.

I cannot here omit to remark on the satisfaction I derive from the effects of this treatment on the fertility of the land in my occupation. My rich pastures are not tending to impoverishment, but to increased fertility; their improvement in condition is apparent. A cow in full milk, giving 16 quarts per day, of the quality analyzed by Haidlen, requires, beyond the food necessary for her maintenance, 6 to 8 pounds per day of substances containing 30 or 25 per cent. of protein. A cow giving on the average 8 quarts per day, with which she gains 7 to 9 pounds per week, requires 4 to 5 pounds per day of substances rich in protein beyond the food which is necessary for her maintenance. Experience of fattening gives 2 pounds per day, or 14 pounds per week, as what can be attained on an average and for a length of time. If we considered $\frac{1}{2}$ pound per day as fat, which is not more than probable, there will be $1\frac{1}{2}$ pounds for flesh, which, reckoned as dry material, will be about $\frac{1}{3}$ pound; which is assimilated in increase of fibrine and represents only $1\frac{1}{3}$ to 2 pounds of substances rich in protein beyond what is required for her maintenance.

If we examine the effects on the fertility of the land, my milch cows, when on rich pasture, and averaging a yield of nine quarts per day, and reckoning one cow to each acre, will carry off in 20 weeks 25 pounds of nitrogen, equal to 30 of ammonia. The same quantity of milk will carry off 7 pounds of phosphate of lime in 20 weeks from each acre.

A fattening animal gaining flesh at the rate I have described will carry off about one-third of the nitrogen (equal to about 10 pounds of ammonia) abstracted by the milch cow, whilst if full grown it will restore the whole of the phosphate.

It is worthy of remark that experience states that rich pastures used for fattening, fully maintain their fertility through a long series of years; whilst those used for dairy cows require periodical dressings to preserve their fertility.

If these computations be at all accurate, they tend to show that too little attention has been given to the supply of substances rich in nitrogenous compounds in the food of our milch cows, whilst we have laid too much stress on this property in food for fattening cattle. They tend also to the inference that in the effects on the fertility of our pastures used for dairy purposes, we derive advantage, not only from the phosphate of lime, but also from the gelatine of bones used as manure.

On comparing the results from my milch cows fed in summer on rich pasture, and treated at the same time with the extra food I have described, with the results when on winter food, and whilst wholly housed, taking into account both the yield of milk and the gain of weight, I find those from stall-feeding full equal to those from depasture. The cows which I buy as strippers, for fattening, giving little milk, from neighboring farmers who use ordinary food, such as turnips with straw or hay, when they come under my treatment, increase their yield of milk, until after a week or two they give two quarts per day more than when they came, and that too of a much richer quality.

Richness of Milk and Cream.

I sometimes observe in the weekly publications which come under my notice, accounts of cows giving large quantities of butter; these are usually, however, extraordinary instances, and not accompanied with other statistical information requisite to their being taken as a guide; and it seldom happens that any allusion is made to the effects of the food on the condition of the animals, without which no accurate estimate can be arrived at. On looking over several treatises to which I have access, I find the following statistics on dairy produce:—Mr. Morton, in his "Cyclopædia of Agriculture," p. 621, gives the results of the practice of a Mr. Young, an extensive dairy-keeper in Scotland. The yield of milk per cow is stated at 680 gallons per year; he obtains from 16 quarts of milk, 20 ounces of butter, or for the year, 227 pounds per cow; from 1 gallon of cream 3 pounds of butter, or 12 ounces per quart.* Mr. Young is described as a high feeder; linseed is his chief auxiliary food for milch cows. Professor

*The usual measure in England and Scotland, is wine measure, that of Massachusetts, is beer measure, which is about a fifth greater in quantity.—R. S. F.

Johnston ("Elements of Agricultural Chemistry") gives the proportion of butter from milk at $1\frac{1}{2}$ ounces per quart, or from 16 quarts 24 ounces; being the produce of four cows of different breeds—Alderney, Devon, and Ayrshire—on pasture, and in the height of the summer season. On other four cows of the Ayrshire breed he gives the proportion of butter from 16 quarts as 16 ounces, being 1 ounce per quart. These cows were likewise on pasture. The same author states the yield of butter as one-fourth of the weight of cream, or about 10 ounces per quart. Mr. Rawlinson ("Journal of the Royal Agricultural Society," vol. xiii., p. 38) gives the produce of 20,110 quarts of milk churned by hand as 1,109 pounds of butter, being at the rate of fully 14 ounces per 16 quarts of milk; and from 23,156 quarts of milk, 1,525 pounds of butter, being from 16 quarts nearly $16\frac{3}{4}$ ounces of butter. The same author states that the yield of butter derived from five churnings of 15 quarts of cream each is somewhat less than 8 ounces per quart of cream. Dr. Muspratt, in his work on the "Chemistry of Arts and Manufactures," which is in the course of publication, gives the yield of butter from a cow per year in Holstein and Lunenburg at 100 pounds, in England at 160 pounds to 180 pounds. The average of butter from a cow in England is stated to be 8 ounces or 9 ounces per day, which, on a yield of 8 to 9 quarts, is 1 ounce per quart, or for 16 quarts 16 ounces. The quantity of butter derived from cream is stated as one-fourth, which is equal to about 9 ounces per quart. The richest cream of which I find any record is that brought to the Royal Society's meeting during the month of July, for the churns which compete for the prize. On referring to the proceedings of several meetings, I find that 14 ounces per quart of cream is accounted a good yield.

I have frequently tested the yield of butter from a given quantity of my milk. My dairy produce is partly disposed of in new milk, partly in butter and old milk, so that it became a matter of business to ascertain by which mode it gave the best return. I may here remark that my dairy practice has been throughout on high feeding, though it has undergone several modifications. The mode of ascertaining the average yield of butter from milk has been to measure the milk on the churning day after the cream has been skimmed off, then to measure the cream, and having, by adding together the two measurements, ascertained the whole quantity of milk (including the cream) to compare it with that of the butter obtained. This I consider a more accurate method than measuring the new milk, as there is a considerable escape of gas, and consequent subsidence, whilst it

is cooling. The results have varied from 24 to 27¼ ounces from 16 quarts of milk. I therefore assume in my calculation 16 quarts of milk as yielding a roll (25 ounces) of butter.

As I have at times a considerable number of cows bought as strippers, and fattened as they are milked, which remain sometimes in my stalls eight or nine months, and yield towards the close but five quarts per day, I am not enabled to state with accuracy and from ascertained data the average yield per year of my cows kept for dairy purposes solely. However, from what occurs at grass-time, when the yield is not increased, and also from the effects of my treatment on cows which I buy, giving a small quantity, I am fully persuaded that my treatment induces a good yield of milk.

As the yield of butter from a given quantity of cream is not of such particular consequence, I have not given equal attention to ascertain their relative proportions. I have a recollection of having tested this on a former occasion, when I found 14 to 16 ounces per quart, but cannot call to mind under what treatment this took place.

On questioning my dairywoman, in December, 1854, as to the proportion of cream and butter, she reported nearly one roll of 25 ounces of butter to one quart of cream. I looked upon this as a mistake. On its accuracy being persisted in, the next churning was carefully observed, with a like proportion. My dairy cows averaged then a low range of milk as to quantity—about eight quarts each per day. Six of them, in a forward state of fatness, were intended to be dried for finishing off in January; but, owing to the scarcity and consequent dearness of calving cows, I kept them on in milk till I could purchase cows to replace them, and it was not till February that I had an opportunity of doing so. I then bought four cows within a few days of calving; they were but in inferior condition, and yielded largely of milk. Towards the close of February and March, four of my own dairy cows, in full condition, likewise calved. During March, three of the six which had continued from December, and were milked nearly up to the day of sale, were selected by the butcher as fit for his purpose. Each churning throughout was carefully observed, with a similar result, varying but little from 25 ounces of butter per quart of cream; on Monday, April 30, 16 quarts of cream having yielded 16 rolls (of 25 ounces each) of butter. Though I use artificial means of raising the temperature of my dairy, by the application of hot water during cold weather, yet, my service pipes being frozen in February, I was unable to keep up the temperature, and it fell to 45°. Still my cream, though slightly affected, was peculiarly

rich, yielding 22 ounces of butter per quart. Throughout April the produce of milk from my 15 dairy cows averaged full 160 quarts per day.

My cows are bought in the neighboring markets with a view to their usefulness and profitableness. The breeds of this district have a considerable admixture of the short-horn, which is not noted for the richness of its milk. It will be remarked that during the time these observations have been continued on the proportion of butter from cream, more than one-half of my cows have been changed.

Having satisfied myself that the peculiar richness of my cream was due mainly to the treatment of my cows, which I have sought to describe, it occurred to me that I ought not to keep it to myself; inasmuch as these results of my dairy practice not only afforded matter of interest to the farmer, but were fit subjects for the investigation of the physiologist and the chemist. Though my pretensions to acquirements in their instructions are but slender, they are such as enable me to acknowledge benefit in seeking to regulate my proceedings by their rules.

In taking off the cream I use an ordinary shallow skimmer of tin perforated with holes, through which any milk gathered in skimming escapes. It requires care to clear the cream; and even with this some streakiness is observable on the surface of the skimmed milk. The milk bowls are of glazed brown earthenware, common in this district; they stand on a base of 6 to 8 inches, and expand at the surface to nearly twice that width. Four to five quarts are contained in each bowl, the depth being 4 to 5 inches at the centre. The churn I use is a small wooden one, worked by hand, on what I believe to be the American principle. I obtained it from Messrs. Dray & Co. I have forwarded to Professor Way a small sample of butter for analysis; 15 quarts of cream were taken out of the cream jar, and churned at three times in equal portions:—

The first five quarts of cream gave	. .	127 ounces of butter.
Second five " "	. .	125 " "
Third five " "	. .	120½ " "
		372½ " "

Equal to 24¾ ounces per quart.

At a subsequent churning of 14 quarts of cream—

The first seven gave 7 rolls or	. . .	175 ounces of butter.
Second seven gave 7 rolls 2 oz., or	. .	177 " "
		352 " "

Equal to 25¼ ounces per quart.

On testing the comparative yield of butter and of butter-milk, I find 70 per cent. of butter to 30 per cent. of butter-milk, thus reversing the proportions given in the publications to which I have referred. An analysis of my butter by Professor Way gives:—

Pure fat or oil,	82.70
Casein or curd,	2.45
Water, with a little salt,	14.85
Total,	100.00

The only analysis of this material which I find in the publications in my hand are two by Professor Way, "Journal," vol. xi. p. 735, "On butter by the common and by the Devonshire method;" the result in 100 parts being:—

	Raw.	Scalded.
Pure butter,	79.72	79.12
Casein, &c.,	3.38	3.37
Water,	16.90	17.51
Total,	100.00	100.00

The foregoing observation of dairy results was continued up to grass time in 1855. In April and May the use of artificial means was discontinued without diminution in the yield of butter or richness of cream, the natural temperature being sufficient to maintain that of my dairy at 54° to 56°.

I now proceed to describe the appearances since that time. In the summer season, whilst my cows were grazing in the open pastures during the day and housed during the night, being supplied with a limited quantity of the steamed food each morning and evening, a marked change occurred in the quality of the milk and cream; the quantity of the latter somewhat increased, but instead of 25 ounces of butter per quart of cream, my summer cream yielded only 16 ounces per quart.

I would not be understood to attribute this variation in quality to the change of food only; it is commonly observed by dairy-keepers that milk during the warm months of summer is less rich in butter, owing probably to the greater restlessness of the cows, from being teased by flies, &c. I am by no means sure that, if turning out during the warm months be at all advisable, it would not be preferable that this should take place during the night instead of during the day time. Towards the close of September, when the temperature

had become much cooler and the cows were supplied with a much larger quantity of the steamed food, results appeared very similar to those which I had observed and described from December to May, 1855. During the month of November the quality was tested with the following result.

From 252 quarts of old milk were taken 21 quarts of cream, of which 20 were churned, and produced 468 ounces of butter, which shows:—

27.50 ounces of butter from 16 quarts of new milk.
23.40 " " from each quart of cream.

During May, 1856, my cows being on open pasture during the day were supplied with two full feeds of the steamed mixture, together with a supply of green rape-plant each morning and evening.

The result was that from 324 quarts of old milk 23 quarts of cream were skimmed, of which 22 were churned and produced 515 ounces of butter, which shows:—

24 ounces of butter from 16 quarts of new milk.
22.41 " " from each quart of cream.

My food during the winter season, 1855–6 has slightly varied from that of 1854–5. In October, a respectable maltster in this village, who keep dairy cows, asked me to purchase malt combs, of which he had a surplus. Having learned from him on inquiry that from the use of them he obtained a larger yield of milk, without detriment to the condition of his cows, I was led to think that they contained a considerable percentage of albuminous matter. I took some on trial and forwarded a sample for analysis, which I supply, together with one of bran:—

Malt Combs.		*Bran.*	
Moisture,	3.21	Moisture,	12.85
Oil,	2.96	Oil,	5.56
Albuminous matter,	23.87	Albuminous matter,	13.80
Starch, sugar, &c.,	45.95	Ash,*	6.11
Woody fibre,	18.80	Other constituents,	61.68
Mineral matter,	5.22		
J. T. Way.	100.00	Anderson.	100.00

I have used malt combs, together with bran, half and half, during the present season. Having a larger stock than the year before, with

* The ash contains 50 per cent. phosphoric acid.

about an equal quantity of hay and less of roots, I reduced the allowance of the former from 12 pounds to 9 pounds, and that of mangel from 36 pounds to 28 pounds per day. I gave also 1 pound of rape-cake additional to each, 6 pounds in lieu of 5 pounds. On this fare, and with such changes of cows as were called for, my yield of milk, of which a register is kept, ranged during the months of October, November, December and January, at 160 to 164 quarts per day from 18 cows, being fully 9 quarts per day from each cow. Their improvement in condition will appear from the following table :—

No.	WEIGHT. 1855.				WEIGHT. 1856.				GAIN.			
		cwt.	qr.	lbs.		cwt.	qr.	lbs.			lbs.	lbs.
STALL A.												
1.	Oct. 9,	10	3	0	Jan. 29,	11	3	0	16 weeks,		112	Per wk. 7
2.	Oct. 9,	9	3	0	Jan. 29,	9	3	0	16	"	112	" 7
3.	Oct. 9,	10	1	0	Jan. 29,	11	0	0 c	16	"	84	" 5¼
4.	Dec. 3,	10	0	0	Jan. 29,	10	0	12	8	"	12	" 1½
5.	Jan. 1,	10	0	0	Jan. 29,	9	0	16 c	4	"	16	" 4
6.	Oct. 9,	9	0	0	Jan. 29,	9	3	0	16	"	84	" 5¼
7.	Oct. 9,	9	2	0	Jan. 29,	9	3	20 c	16	"	48	" 3
STALL B.												
1.	Oct. 9,	11	1	0	Jan. 29,	12	2	20	16 weeks,		160	" 8¼
2.	Oct. 9,	11	1	0	Jan. 29,	12	1	0	16	"	112	" 7
3.	Oct. 9,	–	–	–	Jan. 29,	9	2	0	Newly calved.			
4.	Oct. 9,	10	2	0	Jan. 29,	12	2	0	16 weeks,		224	" 14
5.	Oct. 9,	9	2	0	Jan. 29,	10	0	8 c	16	"	64	" 4
6.	Oct. 9,	11	0	0	Jan. 29,	11	3	0	16	"	84	" 5¼
7.	Jan. 1,	9	2	0	Jan. 29,	9	3	0	4	"	28	" 7
8.	Oct. 9,	10	1	0	Jan. 29,	11	1	0	16	"	112	" 7
9.	Dec. 3,	11	1	0	Jan. 29,	11	2	0 c	8	"	28	" 3½
10.	Oct. 9,	8	3	16	Jan. 29,	9	1	16 c	16	"	56	" 3½
11.	Oct. 9,	3	0	0	Jan. 29,	10	3	16	16	"	128	" 8

The cows, No. 2 and No. 7, stall A, calved in September. Soon after calving each yielded 20 quarts per day. On their first weighing, No. 2 weighed 9 cwt. 3 quarters ; No. 7, 9 cwt. 2 quarters. At the next,

No. 2 had lost 28 pounds; No. 7 had exactly maintained its weight. On this being discovered, the attendant was ordered to give No 2 a little bean-meal in addition. At the expiration of 16 weeks No. 2 gave 16 quarts, No. 7, 12 quarts per day; their respective weights were—No. 2, 9 cwt. 3 quarters, having regained her weight, and No. 7, 9 cwt. 3 quarters 20 pounds, having gained 48 pounds. Eight weeks later, with a reduced yield of milk, No. 2 weighed 10 cwt., having gained 28 pounds; No. 7, 104 pounds from the time of calving. No. 2 was free from calf; No. 7 in the incipient stage of calf; five others, also marked c, were in a like state of incipient calf.

No. 4, stall B, which shows the greatest gain, was far advanced in calf, giving but little milk.

Nos. 1, 2, 7, 8, and 11, in stall B, which had gained respectively 8¼ pounds, 7 pounds, 7 pounds, 7 pounds, 8 pounds per week, were in course of fattening. I do not keep a separate account of the yield of each cow: the average yield of this class during the 16 weeks will have been about 8 quarts per day each; those gaining at a less rate per week—Nos. 4, 5, &c. in stall A, and 9, 10, &c. in stall B—may be reckoned as giving a greater yield of milk.

In February and March, 1856, four cows which had calved at the like period of 1855, were sold as fat for £19 15*s.* each; at the same time, in 1856, I bought cows of equal quality and capability, dry, or giving a small quantity of milk under ordinary treatment, at £11 to £13 each, to fatten, which will require six months. My cows thus fatted have the repute of killing well, and I am enabled to obtain the top price of the day; of the four sold in February and March, the purchasers have supplied me with the weights of loose fat.

Mr. Lupton,	Burley,	150 lbs. loose fat,	live weight	14 cwt.	
Mr. Wilson,	Bradford,	152 "	"	"	12 cwt. 2 qrs.
"	"	132 "	"	"	11 cwt. 1 qr.
"	"	90 "	"	"	11 cwt. 3 qrs.

It will be observed that No. 2, stall A, with an average yield of milk of 18 quarts per day, maintained her weight during 16 weeks; whilst No. 7, with an average yield of 16 quarts per day, gained 48 pounds in the like time. Taking Haidlen's analysis as a basis for calculation, the cow No. 2 will have given off in casein 2¼ pounds per day, equal to 15¾ pounds per week, which represents the albumen of 9 pounds per day, or 63 pounds per week, of feeding substances containing 25 per cent. of this matter. The bulky food I have described, straw, roots, and hay, with rape-cake 6 pounds, malt

combs 1 pound, bran 1 pound, and bean-meal 2 pounds—have sufficed for this, and have also maintained the weight or condition of the cow.

The six cows, giving 8 quarts of milk per day during 16 weeks, will have given off per day 1 pound of dry casein, equal to 7 pounds per week, and may have assimilated in dry fibrine 1 pound, equal to 4½ pounds of flesh; these together represent 5 pounds per day, or 35 pounds per week, of food, containing 25 per cent. of albumen. As this class of animals have been supplied with 7 to 8 pounds per day of such substances, it will be obvious that their excrement has been richer in nitrogen than that of No. 2.

If we allow a gain of weight of 16 pounds per week, which is more than can be attained on the average by fattening, and reckon 12 of this as flesh or lean beef, equal to 2.70 per week, or .39 per day, of dry fibrine, it will represent 1.56 pounds per day, or 10.92 pounds per week for what is assimilated in the fattening process beyond what is adequate for maintenance.

I adduce these calculations in corroboration of my proposition that food rich in albumen has a more especial value for the production of milk than for fattening or beef-making.

There is doubtless some standard of food adapted to the constitution and purposes of animals, combining with bulk a due proportion of elements of respiration, such as sugar, starch, &c., together with those of nutrition, viz., nitrogenous compounds, phosphates, and other minerals; nor can we omit oil or fat-forming substances; for however we may be disposed to leave to philosophy the discussion as to whether sugar, starch, &c., are convertible into fat, yet I think I shall not offend the teacher of agricultural chemistry by stating that the more closely the elements of food resemble those in the animal and its product, the more efficacious will such food be for the particular purpose for which it is used.

Sugar, starch, &c., vary very considerably in form and proportion from vegetable oils, which closely resemble animal fats.

When we consider that plants have a two-fold function to perform, viz., to serve as food for animals and also for the reproduction of the like plants, and that after having undergone the process of digestion they retain only one-half or one-third of their value as manure, the importance of affording a due but not excessive supply of each element of food essential to the wants and purposes of the animal will be evident. If we fall short, the result will be imperfect; if we supply in excess, it will entail waste and loss.

Linseed and rape-cake resemble each other very closely in chemical composition; the latter is chiefly used for manure, and its price ranges usually about half that of linseed cake. In substances poorer in nitrogen and with more of starch, gum, oil, &c., the disparity in value as food and as manure will be proportionately greater.

During the present season Mr. Mendelssohn, of Berlin, and Mr. Gausange, who is tenant of a large royal domain near Frankfort on the Oder, on which he keeps about 150 dairy cows, have been my visitors. These gentlemen have collected statistics in dairy countries through which they have travelled. I learned from them that in Mecklenburg, Prussia, Holland, &c., 14 quarts of milk yield, on the average, 1 pound of butter; in rare instances 12 quarts are found to yield 1 pound. Both attach great importance to the regulation of the temperature. Mr. Mendelssohn tells me that the milk from cows fed on draff, (distillers' refuse,) requires a higher temperature to induce its yield of butter than that from cows supplied with other food.

On inquiry in my own neighborhood, I find it is computed that each quart at a milking represents 1 pound of butter per week. Thus a cow which gives 4 quarts at each milking, will yield in butter 4 pounds per week, or from 56 quarts 64 ounces of butter, or from 14 quarts of milk 1 pound of butter. Taking the winter produce alone, it is lower than this; the cream from my neighbors' cows, who use common food, hay, straw and oats, somewhat resembles milk in consistency, and requires three to four hours, sometimes more, in churning. On one occasion a neighboring dairywoman sent to borrow my churn, being unable to make butter with her own; I did not inquire the result. If she had sent her cow, I could in the course of a week have insured her cream which would make butter in half an hour. These dairy people usually churn during winter in their kitchen, or other room with a fire. Each of them states that from bean or oatmeal used during winter as an auxiliary food, they derive a greater quantity of butter, whilst those who have tried linseed-oil have perceived no benefit from it.

My own cream during the winter season is of the consistency of paste or thick treacle. When the jar is full, a rod of two feet long, will, when dipped into the cream to half its length, stand erect. If I take out a teacup-full in the evening and let it stand till next morning, a penny piece laid on its surface will not sink; on taking it off I find the underside partially spotted with cream. The churnings are performed in a room without fire, at a temperature in winter of 43° to 45°, and occupy one-half to three-quarters of an hour.

Several who have adopted my system have reported similar effects —an increase in the quantity with a complete change as to richness of quality. I select from these Mr. John Simpson, a tenant farmer residing at Ripley, in Yorkshire, who at my request stated to the committee of the Wharfdale Agricultural Society that he and a neighbor of his, being inconvenienced from a deficient yield of milk, had agreed to try my mode of feeding, and provided themselves with a steaming apparatus. This change of treatment took place in February, 1855. I quote his words:—

"In about five days I noticed a great change in my milk, the cows yielded 2 quarts each, per day, more; but what surprised me most was the change in the quality; instead of poor winter cream and butter, they assumed the appearance and character of rich summer produce; it only required 20 minutes for churning, instead of two to three hours; there was also a considerable increase in the quantity of butter, of which, however, I did not take any particular notice. My neighbor's cow gave 3 quarts per day in addition, and her milk was so changed in appearance that the consumers to whom he sold it became quite anxious to know the cause."

My dairy is but 6 feet wide by 15 long, and 12 high; at one end (to the north) is a trellis window, at the other an inner door which opens into the kitchen. There is another door near to this which opens into the churning-room, having also a northern aspect; both doors are near the south end of the dairy. Along each side, and the north end, two shelves of wood are fixed to the wall, the one 15 inches above the other; 2 feet higher is another shelf, somewhat narrower but of like length, which is covered with charcoal, whose properties as a deodorizer are sufficiently established. The lower shelves being 2 feet 3 inches wide, the interval or passage between is only 1 foot 6 inches. On each tier of shelves is a shallow wooden cistern lined with thin sheet-lead, having a rim at the edges 3 inches high. These cisterns incline downwards slightly towards the window, and contain water to the depth of 3 inches. At the end nearest the kitchen each tier of cisterns is supplied with two taps, one for cold water in summer, the other with hot for winter use. At the end next the north window is a plug or hollow tube, with holes perforated at such an elevation as to take the water before it flows over the cistern.

During the summer the door towards the kitchen is closed, and an additional door is fixed against it, with an interval between well packed with straw; a curtain of stout calico hangs before the trellis window, which is dipped in salt water, and kept wet during the whole

day by cold water spurted over it from a gutta-purcha tube. On the milk being brought in it is emptied into bowls. Some time after these bowls (of which a description is given in a former part of this) have been placed on the cistern, the cold-water taps are turned till the water rises through the perforated tube, and flows through a waste pipe into the sewer. The taps are then closed, so as to allow a slight trickling of water, which continues through the day. By these means I reduce the temperature, as compared with that outside the window, by 20°. I am thus enabled to allow the milk to stand till the cream has risen, and keep the skimmed milk sweet, for which I obtain 1*d.* per quart.

Having heard complaints during very hot weather of skimmed milk, which had left my dairy perfectly sweet, being affected so as to curdle in cooking on being carried into the village, I caused covers of thick calico (the best of our fabrics for retaining moisture) to be made; these are dipped in salt water and then drawn over the whole of the tin milk cans; the contrivance is quite successful, and is in great favor with the consumers. I have not heard a single complaint since I adopted it.

Finding my butter rather soft in hot weather, I uncovered a draw-well, which I had not used since I introduced water-works for the supply of the village and my own premises. On lowering a thermometer down the well to a depth of 28 feet, I found it indicated a temperature of 43°—that on the surface being 70°. I first let down the butter, which was somewhat improved, but afterwards the cream; for this purpose I procured a movable windlass, with a rope of the required length; the cream-jar is placed in a basket 2 feet 4 inches deep, suspended on the rope, and let down the evening previous to churning. It is drawn up early next morning and immediately churned; by this means the churning occupies about the same time as in winter, and the butter is of like consistency.

The advantage I derive from this is such that, rather than be without it, I should prefer sinking a well for the purpose of reaching a like temperature.

When winter approaches, the open trellis window to the north is closed, an additional shutter being fixed outside, and the interval between this and an inner shutter closely packed with straw to prevent the access of air and cold; the door to the kitchen is at the same time unclosed to admit warmth. Before the milk is brought from the cow-house the dairymaid washes the bowls well with hot water, the effect of which is to take off the chill but not to warm them; the milk is

brought in as milked, and is passed through a sile into the bowls, which are then placed on the cistern. A thermometer, with its bulb immersed in the milk, denotes a temperature of about 90°. The hot water is applied immediately at a temperature of 100° or upwards, and continues to flow for about five minutes, when the supply is exhausted. The bowls being of thick earthenware—a slow conductor—this does not heighten the temperature of the milk. The cooling, however, is thereby retarded, as I find the milk, after standing four hours, maintains a temperature of 60°. This application of hot water is renewed at each milking to the new milk, but not repeated to the same after it has cooled. The temperature of the dairy is momentarily increased to above 60°, but speedily subsides, the average temperature being 52° to 56°.

It will be observed that the churnings in summer and winter occupy half an hour or upwards; by increasing the temperature of the cream I could easily churn in half the time, but I should thereby injure the quality of the butter. When the butter has come, and gathered into a mass, it is taken, together with the buttermilk, out of the churn, which is rinsed with water; the butter is then placed again in the churn, with a quantity of cold spring water in which salt has been dissolved, at the rate of 1 ounce per quart of cream; after a few minutes' churning, the butter is again taken out; the water in which it has been washed assumes a whitish appearance. By this process the salt is equally diffused through the butter, which requires little manipulation, and is freed from a portion of caseous matter. A recent analysis of my butter shows only 1.07 instead of 2.45 per cent. of casein, as before; that it ranks as choice may be inferred, when I state that my purchaser willingly gives me 1*d.* per roll more than the highest price in Otley market, and complains that I do not supply him with a greater quantity.

In this dairy of the small dimensions I have described, my produce of butter reaches at times 60 to 70 pounds per week. Though the size may appear inconveniently small, yet I beg to remark on the greater facility of regulating the temperature of a small in comparison with a large dairy. This difficulty will be found greater in summer than in winter, as it is far easier to heighten than depress the temperature.

I have cooked or steamed my food for several years. It will be observed that I blend bean-straw, bran and malt combs, as flavoring materials, with oat or other straw and rape-cake: the effect of steaming is to volatilize the essential oils, in which the flavor resides, and

diffuse them through the mess. The odor arising from it resembles that observed from the process of malting; this imparts relish to the mess, and induces the cattle to eat it greedily; in addition to which I am disposed to think that it renders the food more easy of digestion and assimilation. I use this process with advantage for fattening, when I am deficient in roots. With the same mixed straw and oat-shells, 3 to 4 pounds each of rape-cake, and ½ pound of linseed oil, but without roots, I have fattened more than 30 heifers and cows free from milk, from March up to the early part of May; their gain has averaged fully 14 pounds each per week—a result I could not have looked for from the same materials if uncooked; this process seems to have the effect of rendering linseed oil less of a laxative, but cannot drive off any portion of the fattening oils, to volatilize which requires a very high temperature. My experience of the benefits of steaming is such, that if I were deprived of it I could not continue to feed with satisfaction.

I have weighed my fattening cattle for a number of years, and my milch cows for more than two years; this practice enables me at once to detect any deficiency in the performance of the animals; it gives also a stimulus to the feeders, who attend at the weighings, and who are desirous that the cattle intrusted to their care should bear a comparison with their rivals. Another obvious advantage is in avoiding all cavils respecting the weight by my purchasers, who, having satisfied themselves as to the quality of the animal, now ask and obtain the most recent weighing. The usual computation for a well-fed, but not over fat beast, is, live to dead weight as 21 to 12, or 100 to 59 1-7th, with such modifications as suggest themselves by appearances.

Though many discussions have taken place on the fattening of cattle, the not less important branch of dairy treatment has hitherto been comparatively neglected. I therefore venture to call attention to considerations which have arisen from observations in my own practice, affecting the chemistry and physiology, or, in other words, the science of feeding. That I am seeking aid from its guidance will be apparent, and I have no hesitation in admitting, that beyond the satisfaction from the better understanding of my business, I have latterly derived more benefit or profit from examination of the chemical composition of materials of food than from the treatment or feeding experiments of others which have come under my notice. So persuaded am I of the advantage of this, that I do not feel satisfied to continue the use of any material, with the composition of which I am not acquainted, without resorting to the society's laboratory for an analysis.

To one leading feature of my practice I attach the greatest importance—the maintenance of the condition of my cows, giving a large yield of milk. I am enabled, by the addition of bean-meal in proportion to the greater yield of milk, to avert the loss of condition in those giving 16 to 18 quarts per day; whilst on those giving a less yield and in health, I invariably effect an improvement. Nos. 2 and 7, in stall A, may be regarded as ordinary results from my treatment.

When we take into consideration the disposition of a cow to apply her food rather to her milk than to her maintenance and improvement, it seems fair to infer that the milk of a cow gaining flesh will not be deficient either in casein or butter.

I have already alluded to the efficiency of bean-meal in increasing the quantity of butter; I learn also, from observant dairymen who milk their own cows and carry their butter to market, that their baskets are never so well filled as when their cows feed on green clover, which, as dry material, is nearly as rich in albumen as beans; I am also told, by those who have used green rape plant, that it produces milk rich in butter. From this we may infer that albuminous matter is the most essential element in the food of the milch cow, and that any deficiency in the supply of this will be attended with loss of condition, and a consequent diminution in the quality of her milk.

I am clearly of opinion that you can increase the proportion of butter in milk more than that of casein, or other solid parts. From several, who have adopted my treatment, I learn that on substituting rape-cake for beans, they perceive an increased richness in their milk. Mr. T. Garnett, of Clitheroe, who has used bean-meal largely as an auxiliary food for milch cows during the winter season, tells me that when rape-cake is substituted, his dairymaid, without being informed, perceives the change from the increased richness of the milk. Mr. Garnett has also used linseed-cake in like quantity, still his dairy people prefer rape-cake.

Mr. Whelon, of Lancaster, who keeps two milch cows for his own use, to which he gave bean-meal and bran as auxiliaries, has recently substituted rape-cake for bean-meal; he informs me that in a week he perceived a change in the richness of the milk, with an increase of butter.

The vegetable oils are of two distinct classes: the *drying* or *setting* represented by linseed, the *unctuous* represented by rape-oil. They consist of two proximate elements, margerine and olein; in all probability they will vary in their proportion of these, but in what degree I have not been able to ascertain. Though the agricultural chemists

make no distinction, as far as I am aware, between these two classes of oils, the practitioners in medicine use them for distinct purposes. Cod-liver oil has been long used for pulmonary complaints; latterly, olive, almond, and rape-oils are being employed as substitutes. These are all of the unctuous class of oils. Mr. Rhind, the intelligent medical practitioner of this village, called my attention to some experiments by Dr. Leared, published in the *Medical Times*, July 21st, 1855, with olein alone, freed from margerine, which showed marked superiority in the effect; and I now learn from Mr. Rhind that he is at present using with success the pure olein, prepared by Messrs. Price and Co., from cocoa-nut oil, one of. the unctuous class. That linseed, and others of the drying oils, are used in medicine for a very different purpose, it seems unnecessary to state.

The olein of oil is known to be more easy of consumption and more available for respiration than margerine—a property to which its use in medicine may be attributable.* If we examine the animal fats, tallow, suet, and other fat, they are almost wholly of the solid class, stearine or margerine, closely resembling or identical with the margerine in plants; whilst butter is composed of olein and margerine, combining both the proximate elements found in vegetable oils.†

It seems worthy of remark that a cow can yield a far greater weight of butter than she can store up in solid fat; numerous instances occur where a cow gives off 2 pounds of butter per day, or 14 pounds per week, whilst half that quantity will probably rarely be laid on in fat. If you allow a cow to gain 16 pounds per week, and reckon 7 for fat, there will only remain 9 pounds for flesh, or, deducting the moisture, scarcely 3 pounds (2.97) per week, equal to .42, or less than half a pound per day, of dry fibrine.

The analyses of butter show a very varying proportion of olein and margerine fats: summer butter usually contains of olein 60, and margerine 40 per cent., whilst in winter butter these proportions are reversed, being 40 of olein to 60 of margerine. By ordinary treatment the quantity of butter during winter is markedly inferior; the common materials for dairy-cows in winter are straw with turnips or mangel, hay alone, or hay with mangel. If we examine these materials, we find them deficient in oil, or in starch, sugar, &c. If a cow consume 2 stones or 28 pounds of hay a day, which is probably more

* See "Lehman's Physiological Chemistry."

† Rape is but little cultivated in the United States, and the cake made from its seed is not, therefore, available to us. It seems probable, however, that cotton seed cake will prove an excellent substitute for it, since, as compared with linseed oil cake, it appears to be much richer in olein. See analysis at the end of this article.—R. S. F.

than she can be induced to eat on an average, it will be equal in dry material to more than 100 pounds of young grass, which will also satisfy a cow. That 100 pounds of young grass will yield more butter will scarcely admit of a doubt. The 28 pounds of hay will be equal in albuminous matter and in oil to the 100 pounds of grass, but in the element of starch, sugar, &c., there is a marked difference. During the growth of the plant, the starch and sugar are converted into woody fibre, in which form they are scarcely digestible or available for respiration. It seems, then, not improbable that, when a cow is supplied with hay only, she will consume some portion of the olein oil for respiration, and yield a less quantity of butter poorer in olein.

If you assume summer butter to contain of olein, . .	60	per cent.
" " " of margerine,	40	"
	100	"
If the cow consume of the olein, ...	36	"
The quantity of butter will be reduced from 100 to .	64	"
And the proportions will then be, of olein, ...	40	"
" " of margerine, . .	60	"
	100	"

If you supply turnips or mangel with hay, the cow will consume less of hay; you thereby substitute a material richer in sugar, &c., and poorer in soil. Each of these materials, in the quantity a cow can consume, is deficient in the supply of albumen necessary to keep up the condition of an animal giving a full yield of milk. To effect this, recourse must be had to artificial or concentrated substances of food, rich in albuminous matter.

It can scarcely be expected, nor is it desirable, that practical farmers should apply themselves to the attainment of proficiency in the art of chemical investigations; this is more properly the occupation of the professor of science. The following simple experiment, however, seems worth mentioning. On several occasions, during winter, I procured samples of butter from my next neighbor; on placing these, with a like quantity of my own, in juxtaposition before the fire, my butter melted with far greater rapidity—by no means an unsafe test of a greater proportion of olein.

The chemical investigation of our natural and other grasses has hitherto scarcely had the attention which it deserves. The most valuable information on this subject is in the paper by Professor Way on the nutritive and fattening properties of the grasses in Vol. xiv.,

p. 171, of the Royal Agricultural Society's Journal. These grasses were nearly all analyzed at the flowering time, a stage at which no occupier of grass-land would expect so favorable a result in fattening. We much prefer pastures with young grass not more than a few inches high, sufficient to afford a good bite. With a view to satisfy myself as to the difference of composition of the like grasses at different stages of growth, I sent to Professor Way a specimen of the first crop of hay, cut in the end of June, when the grass was in the early stage of flowering, and one of aftermath, cut towards the close of September, from the same meadow, the analyses of which I give:—

Hay, First Crop.		*Aftermath Hay.*	
Moisture,	12.02	Moisture,	11.87
Albuminous matter,	9.24	Oil and fatty matter,	6.84
Oil and fatty matter,	2.68	Albuminous matter,	9.84
Starch, gum, sugar,	39.75	Starch, gum, sugar,	42.25
Woody fibre,	27.41	Woody fibre,	19.77
Mineral matter,	8.90	Mineral matter,	9.43
	100.00		100.00

A comparison between these will show a much greater percentage of woody fibre, 27.41 in the first crop to 19.77 in the aftermath. The most remarkable difference, however, is in the proportion of oil, being 2.68 in the first crop to 6.84 in the aftermath.

On inquiry from an observing tenant of a small dairy-farm of mine, who has frequently used aftermath hay, I learn that, as compared with the first crop, he finds it induce a greater yield of milk, but attended with some impoverishment in the condition of the cow, and that he uses it without addition of turnips or other roots, which he gives when using hay of the first crop—an answer quite in accordance with what might be expected from its chemical composition.

It is likewise to be presumed that the quickness of growth will materially affect the composition of grasses, as well as of other vegetables. Your gardener will tell you that if radishes are slow in growth they will be tough and woody, that asparagus melts in eating, like butter, and salad is crisp when grown quickly. The same effect will, I apprehend, be found in grasses of slow growth: they will contain more of woody fibre, with less of starch or sugar. The quality of butter grown on poor pastures is characterized by greater solidity than on rich feeding pastures, the cows having to travel over more space, require a greater supply of the elements of respiration, whilst the grasses grown on these poor pastures contain, in all probability,

less of these in a *digestible form* available for respiration. The like result seems probable as from common winter treatment—a produce of butter less in quantity, and containing a greater proportion of margerine, and a less of olein.

It is well known that pastures vary greatly in their butter-producing properties; there is, however, as far as I am aware, no satisfactory explanation of this. If you watch cows on depasture, you observe them select their own food; if you supply cows in stall alike with food, they will also select for themselves. I give rape-cake as a mixture to all, and induce them to eat the requisite quantity; yet some will select the rape-cake first, and eat it up clean, whilst others rather neglect it till towards the close of their meal, and then leave pieces in the trough. Two Alderneys—the only cows of the kind I have as yet had—whose butter-producing qualities are well known, are particularly fond of rape-cake, and never leave a morsel; may not these animals be prompted by their instinct to select such food as is best suited to their wants and propensities? If so, it seems of the greatest importance that the dairyman should be informed of the properties of food most suitable for his purpose, especially whilst in a stall, where they have little opportunity of selecting.

It appears worth the attention of our society to make inquiries as to the localities which are known as producing milk peculiarly rich in butter. When travelling in Germany I well recollect being treated with peculiarly rich milk, cream and butter, on my tour between Dresden and Toplitz, at the station or resting place, on the chaussée or turnpike-road, before you descend a very steep incline to the valley in which Toplitz is situated. I travelled this way after an interval of several years, when the same treat was again offered. It was given as a rarity, and can only be accounted for by the peculiar adaptation of the herbage of the country for the production of butter.

BURLEY HALL, Yorkshire, May, 1856.

P. S. *June 7th*, 1856.—Having had occasion to visit London, I called upon J. F. Wilson, director of Messrs. Price's manufactory at Belmont. In addition to other interesting information in regard to the properties of fats, Mr. Wilson kindly supplied me with a Treatise on Oils, by Jules de Fontenelle à Paris, from which I supply the following particulars:—

				Reaumur.		Olein.	Stearine.
Olive oil congeals (solidifies)	at a	temperature	of	+ 2	=	72	28
Rape oil "	"	"	of	— 5	=	54	46
Linseed oil "	"	"	of	—22		No analysis.	

Olive oil is by far the richest in olein, which accounts for its extended use in cooking, more especially on the continent, where it is a principal ingredient in culinary preparations.

The analysis of rape oil corresponds precisely in its proportion of olein and margerine with that of butter of fair quality.

Jules de Fontenelle very properly observes that an analysis of each of the vegetable oils could not fail to be of the greatest interest.

I may add that we agriculturists have a claim on our professors of chemistry to give their attention to like investigations.

[E.]

The following article, from the *Farmers' and Planters' Encyclopædia*, is worthy of attention and experiment:—

Anthoxanthum Odoratum, the sweet-scented vernal grass. This grass constitutes a part of the herbage of English pastures on almost every kind of soil, attaining its greatest perfection on the deep and moist, loving shady places such as the skirts of woods. Its very early growth and hardiness, with the superior properties of its lattermath, gives it high claims in the composition of all permanent pastures. In England it comes into flower about the middle of April, and in Pennsylvania about the middle of May, (in Massachusetts about the first of June.) When properly combined with other grasses and mown at maturity, it gives to the hay a peculiarly delightful fragrance.

The cause of the high flavor for which Philadelphia "May butter" is so highly celebrated, has hitherto been a matter of vague speculation. This superior flavor, like that distinguishing the Epping and Cambridge butter of the London market, has very naturally been ascribed to something eaten by the cows; but this something has never yet been defined or specified so as to enable persons in other localities to avail themselves of it for the improvement of their own pastures and dairy products.

The American editor of the Farmers' Encyclopædia claims to have traced the peculiar flavor of Philadelphia May butter to the sweet-scented vernal grass, naturalized and abounding in the pastures within marketing distance of the city. He assigns the following reasons for this conclusion. 1. In the dairy region around Philadelphia the vernal

grass, with its vanilla fragrance, constitutes the predominant spring herbage on all pasture-fields and meadows left several years unploughed. The older the pasture the greater the proportion of vernal grass, and the higher flavored the butter. 2. The flavor continues during the development of this grass and invariably declines with its seeding, after which the cattle push the stem aside, in search of fresher herbage. 3. The sweet-scented vernal grass is shown by chemical analysis to contain an aromatic essential oil, the basis of which is benzoin acid, or flowers of benzoin. This is abundant and can be distilled so as to furnish a delightful perfume. As the milk of animals is so very susceptible of acquiring disagreeable tastes from substances fed upon, it is natural to infer that it may be imbued with agreeable flavors, could the proper agents for this purpose be presented in their food. That the benzoin acid is the proximate cause of the peculiarly fine flavor of butter made from pastures where the sweet-scented vernal grass abounds, he has shown by several experiments made in different places where the flowers of benzoin given to cows produced the characteristic flavor. From 20 to 30 grains of benzoin acid was administered twice a day, previously mixed with a little rye or wheat flower, then stirred up with some hot water and mingled with the customary mess.

LETTER RESPECTING THE DANVERS PRIZE COW.

BY E. HERSEY DERBY, ESQ.

SALEM, December 25, 1816.

DEAR SIR: I forward you, agreeable to the request of the Trustees, the information I have obtained respecting Mr. Caleb Oakes' prize cow.

The cow is of a dark red and rather under size; she was first purchased out of a drove. Mr. Oakes bought her, in April, 1813, of his brother-in-law, at which time she was five years old. He made from her the first year, without any extra feeding, 180 pounds of butter. In 1814 he gave her about ten or twelve bushels of meal, and made 300 pounds of butter. In 1815 he allowed thirty or thirty-five bushels of meal and the quantity of butter made was over 400 pounds.

Last spring I called on Mr. Oakes and requested him to keep a particular account this year of the product in milk and butter, which he has been so obliging as to furnish me. She calved the 5th of

April. The calf was killed the 8th of May, being remarkably fine fat veal. Through the season she had good pasturage, and has been allowed one bushel of meal and *all her skim milk.* Sometime in June or July Mr. Oakes weighed the milk, at which time she gave at night, 10 quarts, weight 26½ lbs.; 7 quarts in the morning, weight 18 pounds: making 44½ pounds per day.

Statements of Butter made this Season.

Before calf was killed, . .	17 lbs.	Sept. 4, ...	15 lbs.
May 15, ...	14½ "	Sept. 11, ...	16 "
May 22, ...	16 "	Sept. 18, ...	12 "
May 28, ...	17½ "	Sept. 25, ...	15 "
June 5, ...	19 "	Oct. 2, ...	16¾ "
June 12, ...	18½ "	Oct. 15, ...	15 "
June 19, ...	17 "	Oct. 21, ...	16 "
June 26, ...	18 "	Oct. 29, ...	16 "
July 3, ...	18 "	Nov. 7, ...	16 "
July 10, ...	17 "	Nov. 18, ...	18 "
July 17, ...	16 "	Nov. 23, ...	10 "
July 24, ...	24 "	Nov. 30, ...	13 "
July 31, ...	16 "	Dec. 10, ...	14 "
Aug. 7, ...	15 "	Dec. 20, ...	10 "
Aug. 14, ...	15 "		
Aug. 21, ...	16 "	Total, ...	484½ "
Aug. 28, ...	15 "		

Since Mr. Oakes has had the cow, she has suckled four calves, over four weeks each, and furnished about one quart of milk per day for the use of the family. I purchased of Mr. Oakes some of this year's butter; I think I never saw finer.

I am, &c., &c.,

E. Hersey Derby.

STATEMENT OF PRODUCT OF OTHER COWS.

A cow owned by Thomas Hodges, in North Adams, produced in one year, 425 pounds of butter. Her food consisted of one quart of rye meal, and half a peck of potatoes per day, with very good pasturing.

A cow of Ralph Haskins, in Dorchester, produced 18 quarts per day, and averaged from 14 to 15 quarts for the year. Before grass feed in April, the cream of two days made 2¾ pounds of butter, and was made from 2$\frac{1}{16}$ quarts of cream.

A cow of H. G. Newcomb, Greenfield, from March 27 to May 25, made 100 pounds of butter and reserved 160 quarts of milk. In 14 days made $29\frac{3}{16}$ pounds of butter.

Cow of S. Henshaw, Springfield, gave $17\frac{3}{4}$ pounds of butter per week, and in one case, 21 pounds of excellent butter.

Cow of O. Norris, Springfield, produced, between the first of April and the first of September, 206 pounds of butter, besides using milk and cream freely in the family. Food in the winter, besides hay, from 2 to 4 quarts rye-bran at noon, and when at pasture about 4 quarts of rye-bran at night.

These cows were from the common stock of the country, and much of their superiority may safely be ascribed to care and good management both in feeding and in milking. Instances of much greater yield can be adduced from cows of well known breeds.

A Durhaw cow, belonging to John Hare Powell, of Philadelphia, yielded repeatedly 26 quarts in twenty-four hours, and produced in three days 8 pounds 13 ounces of butter, or at the rate of $20\frac{1}{2}$ pounds per week.

The celebrated Blossom, also an improved Durham, owned by Mr. Conby, in Delaware, gave $253\frac{1}{2}$ quarts of milk per week, being an average of 36 quarts per day, making $17\frac{1}{2}$ pounds of well-worked butter.

The often cited "Cramp" cow, owned in Lewes, England, of the Sussex breed, and out of celebrated stock, has not probably ever been surpassed. From May 1, 1805, to April 2, 1806, her milk produced 540 pounds of butter. In the next year, from 19th of April, her day of calving, to February 27, she produced 450 pounds; and the next year, from the 6th of April, the day she calved, to the 4th of the next April, she produced 675 pounds.

This cow was fed, in the summer season, on clover, lucerne, rye-grass and carrots, three or four times a day, and at noon time with about four gallons of brewers' grains and two of bran mixed together, observing always to give her no more food than she would eat up clean; and in the winter season she had hay, grains and bran, feeding her five or six times a day, keeping the manger perfectly sweet and clean. For a more full and particular account of this wonderful milker, see the Massachusetts Agricultural Journal, Vol. iv. p. 331.

In citing cases of remarkable cows, Flora, an imported Jersey cow, belonging to Thomas Motley, Jr., Esq., of Roxbury, ought not to be omitted.

The milk from this cow, during the period of trial, was not only

kept separate from the milk of the other cows of Mr. Motley, but to prevent any mistake, it was not brought into the dairy at the farm house. It was taken directly to Mr. Motley's own house, where there was no other milk, and there made into butter, which was accurately weighed from churning to churning. Commencing with saving the milk on the 10th of May, the result, to April 27, was as follows:—

May 18,	12 lbs.	14 oz.	Nov. 16,	10 lbs.	12 oz.
May 25,	13 "	8 "	Nov. 23,	9 "	12 "
June 1,	14 "	0 "	Nov. 30,	9 "	4 "
June 8,	14 "	0 "	Dec. 7,	9 "	0 "
June 15,	14 "	0 "	Dec. 14,	9 "	0 "
June 22,	13 "	13 "	Dec. 21,	9 "	0 "
June 29,	13 "	0 "	Dec. 28,	9 "	0 "
July 6,	12 "	12 "	Jan. 4,	8 "	12 "
July 13,	19 "	4 "	Jan. 11,	8 "	4 "
July 20,	12 "	4 "	Jan. 18,	8 "	4 "
July 27,	11 "	8 "	Jan. 25,	8 "	8 "
Aug. 3,	11 "	12 "	Feb. 1,	8 "	8 "
Aug. 10,	11 "	12 "	Feb. 8,	8 "	8 "
Aug. 17,	11 "	4 "	Feb. 15,	8 "	0 "
Aug. 24,	11 "	12 "	Feb. 22,	7 "	8 "
Aug. 31,	11 "	12 "	March 1,	7 "	4 "
Sept. 7,	11 "	0 "	March 8,	7 "	8 "
Sept. 14,	11 "	8 "	March 15,	7 "	0 "
Sept. 21,	11 "	8 "	March 22,	7 "	0 "
Sept. 28,	11 "	4 "	March 29,	7 "	0 "
Oct. 5,	10 "	12 "	April 5,	7 "	0 "
Oct. 12,	11 "	8 "	April 12,	7 "	0 "
Oct. 19,	11 "	12 "	April 19,	6 "	15 "
Oct. 26,	12 "	0 "	April 26,	6 "	0 "
Nov. 2,	11 "	12 "			
Nov. 9,	11 "	3 "	Total,	511 "	2 "

In the statement, made up to the middle of November, Mr. Motley says, Flora "has had no meal or grain, or any food whatever besides grass, with this exception: in August, September, and a part of October I gave her, as I gave all my other cows, a feed of cornstalks morning and evening, as my pastures were almost dried up. I truly believe that with a good rich pasture she would have done better without the corn-fodder than in my pasture with corn-fodder. I have now taken her from pasture, (November 14,) and am feeding with hay and ruta bagas."

During the winter, Flora was fed with plenty of English hay and three quarts of corn and cob-meal per day.

As illustrative of the effects of generous feeding, the following table of the performances of five cows belonging to Mr. Sheldon, of Wilmington, for the years 1855 and 1856, are given. Mr. Sheldon accounts for the difference in the yield of butter, *principally*, to having added, in the second year, ten acres of good mowing land to his pasture, and to *somewhat* better feed generally. It is suggestive of this question, whether there is not a point in feeding for milk, as in manuring land for crops, when up to another point, the additional outlay for richer and better food is not compensated in a very great and profitable ratio, by an increased supply of milk and butter.

The product of five cows, owned by Mr. Sheldon, of Wilmington, for 1855 and 1856:—

Name of Cow.	1855.				1856.				Difference.
	Age.	Calved.	Butter.		Age.	Calved.	Butter.		
			9 days in June.	9 days in Sept.			9 days in June.	9 days in Sept.	
							lbs. oz.	lbs. oz.	lbs. oz.
Grey Cow, . .	4 yrs.	April 8,	8 lbs.	11 lbs.	5 yrs.	April 5,	20 4	16 11	17 15
Beauty, . . .	5 "	May 6,	$9\frac{3}{4}$ "	$13\frac{1}{4}$ "	6 "	May 1,	19 2	17 4	13 6
Black Nelly, ,	9 "	April 8,	10 "	13 "	10 "	Mar. 24,	16 8	17 8	11
Patience, . .	3 "	April 28,	$8\frac{3}{4}$ "	$9\frac{1}{4}$ "	4 "	April 12,	15 8	15	12 8
Nonesuch, . .	3 "	Dec. 23,	$8\frac{3}{4}$ "	$7\frac{3}{4}$ "	4 "	April 4,	20 8	18 10	22 6

It is not probable that the increase of milk was in proportion to the increase of butter, but that the better food added materially to the richness of milk, which accords with the experience of Mr. Horsfall.

It may not be considered irrelevant to say a few words upon the subject of breeding animals for dairy purposes. It is a common error to suppose that if a cow be a good milker, her progeny is likely to be equally good; and breeders, to their great disappointment, frequently find an excellent cow producing very inferior milkers. Observation and experiment, however, have long since established the fact, that the milking qualities of a cow can only be reproduced with any tolerable degree of certainty through her male offspring. This is a well established principle in Switzerland, where very great attention has long been paid to dairy management, and a bull is always selected coming from a cow of superior excellence. This subject was advocated

by Mr. Samuel N. Pomroy, in an article on dairy stock, to be found in the 6th volume of the Society's Transactions, as far back as 1819. He says: "Another cause (for the deterioration of milch cows) may be assigned, and which will be considered, perhaps, by those acquainted with the physiology of animals, as having much greater influence than people are generally aware of, and that is, in the selection of *bulls*, most farmers look to *form* and *color* only, instead of tracing their descent from a *valuable dairy stock*. It has been observed by Linnaeus, that those properties of animals which relate to the vessels, or in scientific terms, the *cortical* substance or *vascular* system, are derived from the male."

It has been stated, that the celebrated Oakes cow never produced her like, and there is no evidence that any bull calf was ever raised from her. Had there been, it is probable that her very remarkable milking qualities might have been transmitted even to our day. While advocating greater care in selection of the male, and urging the importance also of his being in good condition, it is to be desired, in order to insure improvement of dairy stock, that those calves only should be reared for milkers, whose parentage on the female side is also of a high order. In this way, with more care exercised in raising the calves, giving them good shelter in the winter and abundant food, there is every reason to believe that Massachusetts might become eminent in this department of agricultural industry, and that raising dairy stock would be much less of a lottery than it is at present.—R. S. F.

REPORT ON THE COMPOSITION AND AGRICULTURAL VALUE OF COTTON-SEED CAKE.

BY PROF. SAMUEL W. JOHNSON,

Chemist to the Connecticut State Agricultural Society.

HENRY A. DYER, ESQ., COR. SEC.—*Dear Sir:* Respecting the sample of cotton-seed cake, received from you for chemical examination, I have the honor to report, that its composition is not inferior to that of the best flax-seed cake, and in some points its agricultural value surpasses that of any other kind of oil-cake of which I have knowledge, as will appear from the following statement of its composition compared with that of linseed-cake.

No. I. is the cake you sent me.

No. II. gives some of the results of an analysis made by Dr. C. T.

Jackson, on cake prepared by himself from hulled cotton-seed.—*Patent Office Report for* 1855, *ag'l. part.*

No. III., analysis of Dr. Anderson on cotton-cake, made at Edinburgh, Scotland.

No. IV., average composition of eight samples of American linseed-cake.—*Journal of Highland and Ag. Soc. of Scotland*, *July*, 1855, p. 51.

No. V., Meadow, Saxony, Dr. Wolff.

	I.	II.	III.	IV.	V.
Water, ...	6.82	–	11.19	9.23	16.94
Oil, ...	16.47	–	9.08	12.96	–
Albuminous bodies, ...	44.41	48.82	25.16	28.28	10.69
Mucilaginous and Saccharine matters, ...	12.74	. . .	48.93	34.22	40.11
Fibre, ...	11.76			9.00	27.16
Ash, ...	7.80	8.96	5.64	6.21	5.04
	100.00		100.00	100.00	100.00
Nitrogen, ...	7.05	7.75	3.95	4.47	–
Phosphoric acid in ash, . .	2.36	2.45	–	–	–
Sand, ...	.94	–	1.32	–	–

The two points of interest before us are, the *nutritive* and the *manurial* value of this cake. With reference to both, chemistry and practical results agree in their conclusions. The great value of linseed-cake, as an adjunct to hay for fat cattle and milch cows, has long been recognized; and is undeniably traceable in the main to three ingredients of the seeds of the oil-yielding plants. The value of food depends upon the quantity of matters it contains which may be appropriated by the animal which consumes the food. Now, it is proved that the fat of animals is derivable from the *starch*, *gum* and *sugar*, and more directly and easily from the *oil* of the food. These four substances are, then, the *fat-formers*. The muscles, nerves, and tendons of animals, the fibrine of their blood, and the curd of their milk, are almost identical in composition, and strongly similar in many of their properties, with matters found in all vegetable, but chiefly in such as form the most concentrated food. These *blood* (and muscle) *formers* are characterized by containing about 15½ per cent. of nitrogen; and hence are

called *nitrogenous substances.* Since albumin (white of egg) is the type of these bodies, they are also often designated as the *albuminous bodies.*

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

For fattening animals, and for increasing the yield and quality of milk, linseed-cake has long been held in high estimation. This is to be expected from its composition. The muscle of flesh and the curd of milk are increased in quantity, because the albuminous substances of the linseed constitute an abundant and ready source of them; the fat of the animal and the butter of the milk are increased by the presence in the food of so much oil and mucilaginous matters.

A year or two since Mr. M'Lugan, of Scotland, reported in the Journal of the Highland Society, some trials on the value as food of linseed-cake, cotton-seed cake, and bean-meal. Analyses III. represents the composition of the cotton-cake; IV. that of the linseed-cake. The bean-meal has 25 per cent of albuminous matters, but 1½ per cent. of oil, and correspondingly more of the bodies that have the same nutrient funition as the mucilaginous and saccharine matters. Six animals of nearly equal size and quality were fed during three months in winter, with all the turnips and straw they would eat, and in addition, two of them received daily four pounds of linseed-cake, two four pounds of cotton-seed cake, and two four pounds of bean-meal. The animals thrived as well on the cotton-seed cake as on the other kinds of food—as shown by their appearance, and by their weight when slaughtered.

When linseed-cake is fed in too large quantity, it purges the animal. The quality of beef is excellent when the daily dose of oil-cake does not exceed six pounds for an animal of 700 pounds. Cases are on record when more than this quantity has spoiled the beef, giving it a *taste like tallow.*

Probably like results would follow excessive feeding with cotton-seed cake. In the best cotton districts of India, the cotton-seed bears a high value as food for fat cattle. I know of no experiments with it on milch cows, but it is to be expected that here also it will have the same effects as linseed cake.

A Bavarian farmer has recently announced that heifers fed for three months before calving with a little linseed-cake, in addition to their other fodder, acquire a larger development of the milk vessels, and yield more milk afterwards, than similar animals fed as usual. Cotton-seed cake must have an equally good effect.

Some of those who have used cotton-seed cake have found difficulty in inducing cattle to eat it. By giving it at first in small doses, mixed with other palatable food, they soon learn to eat it with relish.

On comparing the analyses II. and I., with the average composition of linseed-cake, IV., it will be seen that the cotton-seed cake is much richer in oil and albuminous matters than the linseed-cake. A correspondingly less quantity will therefore be required. Three pounds of this cotton-seed cake are equivalent to four of linseed-cake of average quality.

The value of the article in question as a manure, is very obviously considerable. The dung of cattle, &c., fed upon it, will be greatly richer, both in nitrogen and phosphates, than that of animals fed on hay alone. Where stock is kept, probably the best manner of using this cake as a fertilizer, is to feed it to the cattle, and carefully apply the manure they furnish. In this way, whatever is not economized as fat or flesh, will be available as manure.

In England and on the continent of Europe, linseed and rape-cake have been used directly as a dressing for the soil, and with results fully equal to what is indicated by their composition. These kinds of cake decompose readily, and their effect is usually finished in one season. Five hundred to six hundred pounds per acre is considered a good application; more is liable to be injurious. It is found that when applied with the seed, these kinds of cake prevent germination to a considerable degree; but if applied a week or so previous to sowing, this detriment is not encountered.

The cotton-seed is often employed in the Southern States, with good effects, as a manure for Indian corn, &c. I do not know whether like rape and linseed-cake, it destroys the seed. For manuring purposes, it is about one-third richer than linseed-cake. Its effects are mostly due to the nitrogen it contains, and therefore are similar to those of guano. It is best used in conjunction with other fertilizers.

I should judge that a mixture of 400 pounds of this cotton-seed cake with 50 bushels of leached wood-ashes per acre, would make an excellent application for most crops. It is highly important that the cake be uniformly distributed, and thoroughly intermixed with the soil.

This cotton-seed cake is doubtless an excellent material for composts, owing to its ready decomposability.

Its commercial value, if calculated from the highest estimates, is as follows: per cwt., 7 pounds nitrogen equals $8\frac{1}{2}$ pounds of ammonia, which at 16 cents per pound, is worth $1.36; $2\frac{1}{3}$ pounds phosphoric acid at 2 cents per pound, is $4\frac{2}{3}$ cents; together, $1.41. This multiplied by 20 gives $28.20 as the value per ton. If the English prices are adopted, viz., 12 cents for ammonia and 3 cents for phosphoric acid, we have $21.80 as the value per ton. The market price, you say, is $25. Therefore, next to Peruvian guano, this is a substance which, if its composition proves uniform, is most nearly worth what it costs.

Yale Analytical Laboratory, March 16, 1857.

INDEX.

TRANSACTIONS

OF THE

MASSACHUSETTS SOCIETY

FOR

PROMOTING AGRICULTURE.

NEW SERIES,

Vol. 1.

BOSTON:
1858.
J. H. EASTBURN'S PRESS.

TRANSACTIONS

OF THE

MASSACHUSETTS SOCIETY

FOR

PROMOTING AGRICULTURE.

NEW SERIES,

Vol. 1.

BOSTON:
1858.
J. H. EASTBURN'S PRESS.

ERRATA.

Page 31. There should be added, after the words "The same Board of Officers was continued this year," the following, *with the exception of the Hon. John Lowell, who declined re-election as President. His Excellency Gov. Caleb Strong was elected in his place.*

Page 97. Israel Thorndike, Jr., Esq., was elected a Trustee, in the place of Hon. Israel Thorndike, who retired.

OFFICERS AND TRUSTEES

FOR THE YEAR

1858.

PRESIDENT:

GEORGE W. LYMAN.

FIRST VICE-PRESIDENT:

CHARLES G. LORING.

SECOND VICE-PRESIDENT:

ROBERT C. WINTHROP.

TREASURER:

THOMAS MOTLEY, Jr.

CORRESPONDING SECRETARY:

JAMES W. PAIGE.

RECORDING SECRETARY:

RICHARD S. FAY.

TRUSTEES:

GEORGE PEABODY,
STEPHEN SALISBURY,
WILLIAM S. LINCOLN,
GEORGE T. BIGELOW,
DAVID SEARS, Jr.,
GEORGE B. LORING.

TABLE OF CONTENTS.

PREFACE.

The following Abstract of the Records of the Massachusetts Society for Promoting Agriculture, has been prepared by its Recording Secretary for the use of its members, with additional copies for general distribution, in compliance with a vote passed at the last annual meeting.

It was not intended that a complete synopsis should be made of the records and publications of the Society, amounting to many volumes, but simply enough to show its origin and progress, the nature of the duties it has performed, and the principles of its action to the present time. It was also thought that this volume would form a fit commencement to a new series of publications for general use, upon topics connected with the pursuits of agriculture, which it is proposed to issue, as materials for the purpose may accumulate. With these objects in view, many things of an apparently trivial nature have been inserted, but which, it is hoped, will interest some readers, while others of seemingly greater importance have been omitted. It is hoped also that these pages will furnish some hints at least, towards a history of the progress of Agriculture in this State, since the early days of the Commonwealth.

There was also another motive for this publication, which it is proper to state. In the winter of 1857, at a meeting of gentlemen interested in the promotion of Agriculture, held at the State House, the Massachusetts Society and its doings formed the principal topic of discussion. The remarks made upon that occasion were in the main honorable to the Society and to those who took an active part in its proceedings. It was evident, however, that great misapprehension existed in the minds of some as to this Society, and more especially as to the doings of its Officers and Trustees. It was asserted, by one gentleman quite competent to judge in the matter, *that there was very great ignorance on the part of the people about the Society, and that many persons knew nothing about it; that it was supposed to have only a respectable existence in State Street, and that it spent the annual bounty of the State in good dinners.** The language made

* For the full report of the discussion, see the Annual Report of the Agriculture of Massachusetts, by C. L. Flint, 1857, p. 8.

use of upon that occasion is not quoted, because the gentleman who used it has publicly disclaimed holding such opinions himself, though the report would lead one to infer that he entertained them in common with others. It is sufficient for the present purpose, to state generally the ideas attempted to be conveyed.

The meeting was a large and public one,* and its doings were officially reported and published in the State Annual Report, and they have probably been read by every farmer in the State. Silence, therefore, on the part of those who have the honor and integrity of this time-honored association in their charge, would be to many minds a virtual admission of the correctness of these opinions. If the idea generally prevails that the money of the State is misapplied by the Society, or by its Officers and Trustees; that from their social position, or from any other cause, there is no sympathy on their part with the agricultural interests, and that they make no efforts to promote the objects for which they are associated, then their usefulness is at an end, and the force of their recommendations and example must cease to have any effect. Painful, therefore, as it is to all honorable minds to be compelled to refute slander or to do away with the effects of ignorance however inexcusable, it becomes a duty to do so, when the cause which this Society was instituted to advance, is injuriously affected by silence on the part of those who are assailed. This task, however, is easily accomplished.

The labors and services of the Officers and Trustees are, and ever have been, entirely gratuitous in the strictest sense of the word. They meet one day in every month, besides frequent meetings of Committees, and it is rare that a Trustee is ever absent. No part of the funds of the Society is ever diverted by the Trustees from their legitimate objects; and, to use language forcible as it is homely, *they work hard and find themselves.* The Officers and Trustees wish to take no credit for this, for it is only what is done by the Officers and Trustees of the other Societies. It is believed that the members of the State Board of Agriculture are the only gentlemen who are indemnified for their services in the cause of Agriculture, and the error has probably arisen from the Massachusetts Society, which is a distinct organization, possessed of no powers or privileges except

* It was called to consider the propriety of forming a *new* State Society. No statement was made, however, as to the duties which were to devolve upon it. The State Board of Agriculture, in its constitution and powers, is a perfect State Society, its Board composed of members from every County Society, its constituency every farmer in the State. It is difficult to conceive of a better organization for the purpose.

such as are conferred upon every other Agricultural Society in the State, being confounded in some minds with that highly useful Board.

It is not, however, sufficient that the funds of the Society and the bounty of the State should not be misapplied. Its mission is an important one, and should be executed by those who feel a lively interest in promoting the science of Agriculture. This is not likely to be the case, if intrusted to those who have only a "respectable existence in State Street."

Nobody, however, will pretend that to make a good Trustee, it is necessary that he should actually hold the plough, plant the corn or wield the scythe, any more than that a good merchant must load and unload his own ships, keep his own books, or hoop his own casks. The Massachusetts Society has always acted upon the principle of selecting for its Officers and Trustees, those whose position enabled them to give their time and attention to the subject, who were also interested in agricultural pursuits, and who, by their counsels and experience, were best calculated to serve with zeal and judgment the best interests of the farmer. The evidence of this in the time past is to be found in the following pages; in the time present, from the fact that the aggregate of farming property held and improved by the twelve Officers and Trustees, taken from actual returns as reported at the last annual meeting of the Society, is probably as great in amount and value, as that of any twelve farmers in the Commonwealth.* It is quite evident, therefore, if their doings do not give satisfaction, it is not from a want of interest in the subject of Agriculture.

The Society has received, through the kindness of Henry F. French, Esq., of Exeter, a Treatise "On the History, Cultivation, Composition, and Feeding Properties of 'Mangold Wurzel,' by John Tynan." It has been reprinted for general circulation, in order to call attention in Massachusetts, to this useful root, as an object of field culture. It has likewise reprinted from the Royal Agricultural Society's Journal for the present year, a very clear and practical Treatise on "Horseshoeing," a subject which, as the writer says, although it "may not legitimately come under the head of Agriculture, it is nevertheless so intimately connected with the interests of the Agriculturalist, and has been so wofully neglected by him," that it is a sufficient reason for attempting to arouse him to a sense of its

* Farming property, including wood, pasture and arable land, owned, occupied and improved by the Officers and Trustees, - - acres,	3484
In actual cultivation, - - - - - - - - - - "	1020
Farm stock, horses and cattle used or bred for beef, milch or work, number of head,	331
Sheep and swine, - - - - - - - - " "	278

importance in a pecuniary point of view, by a publication of his views upon it, in a work devoted to Agriculture.

There have likewise been added, three Essays, for which prizes have been awarded by the Trustees, on subjects of deep interest, and which are now receiving much attention in all parts of the State, more particularly those upon Agricultural Education, and upon Fairs or Markets. All these articles have an independent paging, in order that each may be complete in itself, and adapted for separate circulation. The future publications of this character will be regularly numbered, so that they may be preserved in their proper order and bound in volumes to suit the convenience of the reader.

It is proper to state that, in the publication of selected articles and of essays, the Trustees do not intend to be considered as approving every idea or theory contained in them, whether of principle or practice. They do not, however, propose to circulate and give currency to anything upon the subject of Agriculture, which they do not think will be suggestive and useful, and such as will tend to advance its science and practice. It is also proper to add, that the Secretary is solely responsible for the comments contained in the preface, as well as for those which may occasionally be found in the following pages.

Boston, December, 1858.

THE MASSACHUSETTS SOCIETY

FOR PROMOTING AGRICULTURE.

The earliest society for the promotion of agriculture in the United States was established in Philadelphia, in the year 1785. The Massachusetts Society for Promoting Agriculture was the second institution of the kind, incorporated on the seventh of March, in the year 1792. The following is the Act of Incorporation:

COMMONWEALTH OF MASSACHUSETTS.

In the year of our Lord one thousand seven hundred and ninety-two.

An Act to incorporate and establish a Society by the name of the Massachusetts Society for Promoting Agriculture.

Whereas, Very great and important advantages may arise to the community from instituting a Society for the purpose of promoting agriculture, and divers persons having petitioned to this Court to be incorporated into a Society for this laudable purpose:

Be it therefore enacted by the Senate and House of Representatives in General Court assembled, by the authority of the same, That the said Petitioners, viz: Samuel Adams, John Avery, Jr., Joseph Barrell, Martin Brimmer, Charles Bulfinch, John Codman, Edward Cutts, Aaron Dexter, Thomas Durfee, Moses Gill, Christopher Gore, Benjamin Guild, Stephen Higginson, Henry Hill, Samuel Holten, Benjamin Lincoln, John Lowell, Jonathan Mason, Jonathan Mason, jr., Azor Orne, Samuel Phillips, Thomas Russell, Samuel Salisbury, David Sears, James Sullivan, Cotton Tufts, Charles Vaughan, and Thomas Winthrop, together with such others who shall become members thereof, be and they are hereby incorporated into and

made a body politic and corporate forever, by the name of the Massachusetts Society for Promoting Agriculture.

And be it further enacted by the authority aforesaid, That the said Corporation be and are hereby declared and made capable in law, of having, holding, purchasing and taking in fee simple, or any less estate, by gift, grant, devise, or otherwise, any lands, tenements, or other estate, real and personal, provided that the annual income of the said real and personal estate shall not exceed the sum of ten thousand pounds; and also to sell, alien, devise or dispose of the same estate, real and personal, not using the same in trade or commerce.

And be it further enacted by the authority aforesaid, That the said Corporation shall have full power and authority to make, have, and use a common seal, and the same to break, alter, and renew at pleasure; that it shall be capable in law to sue and be sued, plead and be impleaded, answer and be answered unto, defend and be defended in all Courts of Record, or other Courts or places whatsoever, in all actions, real, personal, and mixed, and to do and execute, all and singular, other matters and things, that to them shall and may appertain to do.

And be it further enacted by the authority aforesaid, That the said Corporation may make, establish, and put in execution, such Laws and Regulations, as may be necessary to the government of said Corporation, provided the same shall in no case be repugnant to the Laws and Constitution of this State. And for the well-governing of said Corporation, and the ordering their affairs, they shall have such officers as they shall hereafter from time to time elect and appoint, and such officers as shall be designated by the Laws and Regulations of the said Corporation for the purpose, shall be capable of exercising such power for the well-governing and ordering the affairs of the said Corporation, and calling and holding such occasional meetings for that purpose, as shall be fixed and determined by the said Laws and Regulations.

And be it further enacted by the authority aforesaid, That the end and design of the institution of the said Society is for the purpose of promoting useful improvements in Agriculture.

And be it further enacted, That the place of holding the first

meeting of the said Society shall be in the town of Boston; and that Samuel Adams, Esq., be, and he hereby is authorised and empowered to fix the time for holding the said meeting, and to notify the same to the members of the said Society, by causing the same to be published in one of the Boston newspapers, fourteen days before the time fixed for holding the said meeting.

In House of Representatives, March 7, 1792.

This Bill having had three several readings, passed to be enacted.

DAVID COBB, *Speaker.*

In Senate, March 7, 1792.

This Bill having had two several readings, passed to be enacted.

SAMUEL PHILLIPS, *President.*

Approved.

JOHN HANCOCK.

True Copy. Attest:

JOHN AVERY, JR., *Secretary.*

After receiving their Act of Incorporation, the Massachusetts Society for Promoting Agriculture held their first meeting at the Council Chamber, in Boston, April 19, 1792. There were present at this meeting, Benjamin Guild, Thomas L. Winthrop, John Avery, jr., Samuel Adams, Benjamin Lincoln, and Aaron Dexter.

At this meeting, John Avery, jr., was chosen Secretary *pro tem.*, to record the transactions of the Society.*

This meeting was adjourned to Thursday, the 26th of April, to meet at the same place at 11 o'clock, A.M., and the Secretary

* Mr. Avery was Secretary of State for Massachusetts, for nearly thirty years, continuing in office from the early days of the government until his death, which occurred in 1806, at the age of 66 years. His wife was the daughter of Lieut. Gov. Cushing. John Avery, jr. was the grandson of Rev. John Avery, the first minister settled at Truro, on Cape Cod. Six of his descendants, of the same name, of successive generations, have graduated at Harvard College. He had a family of ten children,—one of whom, the widow of the late Isaac Mansfield, is living. John Avery, Esq., of Lowell, from whom these facts were obtained, is his grandson.

was requested to notify the members in Saturday's and Thursday's newspapers, to give their punctual attendance.

At the next meeting, April 26, were present Charles Vaughan, Aaron Dexter and John Avery, jr. The weather being stormy and but few members present, it was voted to adjourn to Thursday, May 3, in the same place at 11 A. M., after the regular notification of the meeting in the newspapers.

At this third meeting there were present John Lowell, Aaron Dexter, Christopher Gore, Charles Vaughan, Charles Bulfinch, Thomas L. Winthrop, John Avery, jr. Without transacting any business on this occasion, the meeting was adjourned to Thursday, May 31, to meet at the stockholders' room, in the office of discount and deposits of the U. S. Bank, in State Street, at 11 A. M.

At the meeting of this date, May 31, there were present Azor Orne, Thomas Russell, Moses Gill, Cotton Tufts, Thomas Durfee, Benjamin Lincoln, Charles Vaughan, Charles Bulfinch, Christopher Gore, Martin Brimmer, Aaron Dexter, Thomas L. Winthrop, John Avery, jr., Benjamin Guild.

John Avery, jr. was chosen Secretary of the Society. After this it was voted to proceed to the admission of members, who were elected by hand vote.

It was then voted that Dr. Tufts, Gen. Lincoln, Judge Lowell, Mr. Vaughan and Dr. Dexter be a Committee to frame such laws as they should think necessary for the government of the corporation, and report at the next meeting, which was appointed to take place on Thursday the 14th of June next, in the Massachusetts Bank in State Street, at 11 o'clock, A. M.

At this next meeting there were present Thomas Russell, William Seaver, James Warren, Elbridge Gerry, Timothy Newell, Cotton Tufts, Nathaniel Appleton, Fisher Ames, Joseph Russell, Dudley Tyng, Aaron Dexter, Charles Vaughan, Ebenezer Wales, Benjamin Guild, Loammi Baldwin, Martin Brimmer, Joseph Warren, Christopher Gore, Nathaniel Gorham, Thomas L. Winthrop, Thomas Lee, George Lane, David Wood, Nathaniel Ruggles, Nehemiah Munroe, Benjamin Lincoln, John Avery, jr.

The Committee appointed at the last meeting to frame such

laws and regulations as they should think necessary for the government of the society, reported as follows:

Article 1. There shall be a President, two Vice-Presidents, a Recording Secretary, a Corresponding Secretary, a Treasurer, and six Trustees, in addition to the above officers, who shall be Trustees by virtue of their office.

This was read and accepted. The other articles came under consideration, and after some debate it was voted that the same Committee who made the above report be a committee to revise and arrange the several articles and to report at the next adjourment. It was then voted to proceed to the choice of officers, as provided in the first article.

Dr. Dexter and Mr. Brimmer were made a Committee to collect, sort and count the votes, and reported the following officers chosen.

Thomas Russell, *President.*
John Lowell, *Vice-President.*
Moses Gill, *Vice-President.*
John Avery, Jr., *Recording Secretary.*
Oliver Smith, *Corresponding Secretary.*
Aaron Dexter, *Treasurer.*
Cotton Tufts, Loammi Baldwin, James Bowdoin, Christopher Gore, Charles Vaughan, Martin Brimmer, } *Trustees.*

It was then voted that there be a Committee to make collections of money for the benefit of this society; but the choice of them was deferred till the next meeting, appointed to take place on Friday, June 22, at 11 o'clock, A. M., at Massachusetts Bank in State Street.

On June 22, were present—the President, the Vice-Presidents, Samuel Holton, Azor Orne, Thomas Durfee, Cotton Tufts, Timothy Newell, Fisher Ames, Thomas Lee, Loammi Baldwin, Benjamin Guild, Thomas L. Winthrop, David Wood, Charles Vaughan, John Avery, jr.

The Committee appointed to revise the regulations of the Agricultural Society, made the following report:

Article 1. That there shall be a President, two Vice-Presidents, a Recording Secretary, a Corresponding Secretary, and a Treasurer, who shall be Trustees *ex officio*; in addition to these, six other Trustees shall be chosen from the members at large; all of whom shall continue in office, until others are elected in their stead.

Art. 2. All officers, as well as new members, shall be elected by ballot. The election shall be determined by a majority of votes.

Art. 3. There shall be two stated meetings of the society annually, viz.: on the first Wednesday in April and October, the same to be held at 11 o'clock, A. M., at such place as the Trustees shall appoint, of which they shall give notice in one of the Boston newspapers, at least three weeks previous to said meeting.

Art. 4. There shall be an annual choice of officers, viz.: at the stated meeting in April, in the choice of whom twenty members shall be necessary to make a quorum; in the transaction of other business thirteen may make a quorum.

Art. 5. If at any meeting of the Society or of the Trustees, the President and the Vice-Presidents should be absent, the members present may appoint one from among them to preside at such meeting.

Art. 6. The President, or in case of his absence, either of the Vice-Presidents, with the advice of the Trustees, may call a special meeting of the Society, or whenever written application, with reasons assigned therefor, shall be made by any twelve members of the Society to the President and Trustees, they shall call such meeting.

Art. 7. The meetings of the Trustees shall be held at such time and place as they shall from time to time agree upon, seven of whom with the presiding member shall make a quorum for the doing of business, except in the case of the election of members.

Art. 8. The Trustees shall regulate all the concerns of the Society, during the intervals of its meetings, propose such objects of improvement to the attention of the public, publish such communications and offer premiums in such form and

value as they shall think proper, provided the premiums offered do not exceed the funds of the Society, and shall lay before the Society at each of its meetings, a statement of their proceedings and of the communications made to them.

Art. 9. The candidate for election shall first be proposed by a member of the Society, and on being balloted for, if the number of votes in favor of such candidate shall amount to a majority of the members present, such person shall be considered as duly elected.

Art. 10. The Recording Secretary shall take minutes of all the votes and proceedings of the Society and of the Trustees, and enter them in separate books, and shall record all such communications as the Trustees may direct.

Art. 11. The Corresponding Secretary shall write all letters relating to the business of the Society, and answer all such letters to the Society as the Trustees shall direct.

Art. 12. The Treasurer shall receive all moneys due or payable to the Society, and all donations that may be made to it, for which he shall give duplicate receipts, one of which shall be lodged with the Recording Secretary, and make a fair record thereof, and from time to time pay out such moneys that may be in the treasury as he shall have orders for from the Trustees, and shall annually and whenever thereto required, render a fair account of all his receipts and payments to the Society, or a committee thereof. The Treasurer's accounts shall be kept in dollars and cents, and shall give bonds for the faithful discharge of his duty in such sums as the Trustees shall direct and with such sureties.

Art. 13. A Committee shall be chosen annually to audit the Treasurer's accounts, viz.: at the October meeting, and to report thereon at the next April meeting, and the same being accepted shall be entered by the Recording Secretary in his books.

Art. 14. In case of the death, resignation, incapacity or removal out of the State of either of the Secretaries, or of the Treasurer, the Trustees shall take charge of the official books, papers and effects belonging to the office that may be vacated, and give receipts for the same, which books, papers, &c. they may deliver to some person whom they may appoint to fill up

the office until the next meeting of the Society, at which time there shall be a new choice.

Art. 15. The present members of the Society, and such as may be elected previous to the April meeting, 1793, shall for the present year, severally pay into the hands of the Treasurer two dollars, for raising of a fund for carrying into execution the designs of the institution, and thence, afterwards, two dollars annually, shall be paid by each member, until otherwise ordered by the Society; the second year being considered as commencing on the first Wednesday of April, 1793.

Art. 16. A Committee shall be appointed from time to time, severally to solicit and receive subscriptions for raising of a fund for encouraging the noblest of pursuits, the agriculture of our country, the same to be sacredly appropriated to that purpose.

The above articles having been considered, paragraph by paragraph, were accepted and adopted as "The Regulations of the Massachusetts Society for promoting Agriculture."

A Committee of fifteen members, was then chosen, for the purpose of raising a fund for carrying into effect the designs of the institution. Their names are here given: Thompson I. Skinner, Justin Ely, Timothy Newell, Loammi Baldwin, Azor Orne, Samuel Phillips, Charles Vaughan, Moses Gill, Thomas Russell, William Baylies, James Warren, David Sears, Cotton Tufts, John Lowell, Levi Lincoln.

The meeting was then adjourned.

The organization of the Society was now completed, and preparations had been made for the commencement of its duties. The names of the original members, and of those who were elected under the corporate act, have all been given, in order that the history of its origin, as taken from the records, may appear complete. It will be seen that the originators of the Society and its earliest members were gentlemen of the highest standing in the country, distinguished for their wealth, their learning, and their public and private virtues, and the names borne upon the first rolls of the Society, are honored and freshly remembered at the present day. The Society originated in State

Street. Its earliest meetings for business were held there, and its officers were well known upon "change." Wealth as well as knowledge is power; and men who have united wealth with knowledge, have always been found among those who take the lead in enterprises for the public good. No man understands better than a well educated merchant, the mutual relations of all the great interests of the country, and their dependence on each other. He knows that a flourishing commerce depends upon a prosperous agriculture, and that it always must be the principal source of national wealth. Hence the earliest enterprises for the promotion of agriculture, have originated with enlightened merchants, who comprehended its advantages to the nation, and who possessed the pecuniary ability to carry out their liberal designs. These views will explain why the oldest Agricultural Society in the Commonwealth, should have been founded by men who transacted business in State Street, and why the foremost promoters of similar enterprises have been generally connected with commerce.

A. D., 1792.

The first regular meeting of the Trustees after the organization in June, did not take place until August 3, and was held at the house of Hon. Thomas Russell, the President. At that meeting, a vote was passed, ordering the following publication to be made in the next Thursday's "Independent Chronicle."

"In all countries it has been considered as an object of the first importance to promote agriculture, and in many of them, the institution of societies for that purpose, has been attended with great and happy effects; there is no country in the world in which there is a greater field for improvement than America. Massachusetts, and several other States of the Union, have adopted similar sentiments in regard to this great object; and agreeable to an Act of Incorporation passed the Legislature of

this Commonwealth, at their Session in March last, the Members of the Massachusetts Agricultural Society, have met, and elected their officers, as follows: *—

"They have also chosen a Committee to solicit subscriptions to raise a fund to be distributed in Premiums for the encouragement of useful discoveries and improvements. This Committee reside in different parts of the State.

"The Trustees have agreed to meet once in each month, for the purpose of receiving communications, and promoting the purposes of the institution. It is greatly to be desired that the community at large, and especially the Members of the Society, would engage in earnest in this business; would aid its funds, and make communications of any discoveries they may deem useful, with freedom; the officers of the Society pledge themselves to pay every attention in their power to the great end intended. Among other measures, they recommend that the members in different parts of the State, would meet at stated times, in places convenient to themselves, and invite the aid of others who are desirous of forwarding improvements in agriculture, and that they would from time to time transmit to the Trustees, any information they may think useful."

It will be seen, that almost at the outset, the Trustees commenced their monthly meetings, which have continued to the present day; and the closing sentence of the above communication to the "Chronicle," foreshadows what has since taken place, the formation of separate associations for similar objects, throughout the State. Among the communications received, and read at this meeting, was: "A Letter from the Hon. Cotton Tufts, inclosing a communication from Justin Ely, Esq., of West Springfield, respecting the method of raising hemp, as practiced by many of the farmers in the State of New York."

At the next meeting, which was held in September following, several communications were read. The first was a Pamphlet, containing observations on the diseases, defects and injuries attending all kinds of fruit trees, and forest trees, with an account of a particular method of cure, invented and practiced by Wil-

* The names have already been given.

liam Forsyth, Gardener to the King of Great Britain. It was presented to the Society by Mr. John Jenks, of Salem.

A Committee was appointed to make such extracts from communications on the subject of Agriculture, and to arrange such information for publication as may occur. Dr. Smith, Mr. Vaughan and Mr. Gore, constituted this Committee. This was the commencement of the system of circulating useful information, and it extended through many volumes.

The first semi-annual meeting of the Society, since the adoption of its constitution, took place on the third day of October. A large addition was made to the members of the Society, and among others, the celebrated agricultural author, Arthur Young, was chosen an honorary member.

At this meeting, it was voted, "That it shall be lawful for the Trustees to elect such persons to be members of this Society, as they think proper, and that this vote be made an Article in the Institution of the Society. Also, that that part of the 7th article, which renders seven necessary to be a quorum, be repealed, and in future, five only shall be necessary." Also, "That an application be made to the General Assembly requesting their aid for the promotion of the objects of the Society."

A Pamphlet, containing Papers and Letters on Agriculture, recommended to the attention of farmers, by the Agricultural Society of Canada, transmitted by Thomas A. Coffin, Esq., and transmitted by the Corresponding Secretary, was read.

At the meeting of the Trustees, on the following November, the Committee for obtaining subscriptions in aid of the Society, reported the following result:

Thomas Russell, Three hundred pounds, in six per cent. stock.

Christopher Gore, Two shares in the Bank of the United States.

David Sears, Two hundred dollars, three per cent. U. S. Stock.

Charles Vaughan, One hundred dollars, six per cent. U. S. Stock.

Samuel Elliot, One hundred dollars.

John Codman, Fifty dollars.

Joseph Blake, Twenty-five dollars.

James Tisdale, Twenty-five dollars.

Russell Sturgis, Twenty dollars.

Joseph Cooledge, Twenty-five dollars.

Joseph Russell, Twenty-five dollars.

Joseph Burrell, Two hundred dollars, in three per cent. stock.

Jeremiah Allen, Ten dollars.

Samuel W. Pomroy, One hundred dollars.

John Coffin Jones, Eighty-three dollars, in three per cent. stock.

James Bowdoin, The interest of £400, for five years, at six per cent.

William Wetmore, Two hundred dollars.

All these sums, or the interest upon the same, were to be appropriated as the Trustees should direct.

The President having offered to present to the Society a Common Seal, as expressed in the Act of Incorporation, a Committee was appointed to determine what this device should be. At the next meeting, in accordance with the report of the Committee, the following plan was adopted:—A plough should be a part of the device, with a pair of oxen, connected by a chain to the same. A stone wall, and a quick fence, with a gate; the field beyond the gate, with sheep and cattle; the motto—SOURCE OF WEALTH: filled upon the garter—around the margin of the Seal, *Massachusetts Society for Promoting Agriculture, incorporated* 1792.

At this meeting, a letter was received from Thomas Lee, inclosing the sum of one hundred dollars, for the use of the Society. A vote was passed that the names of gentlemen who shall be proposed as members of the Society, shall stand one month before the balloting. A letter was read from a gentleman, styling himself "A New Hampshire Farmer," dated Dec. 26, 1792, describing a cart, constructed upon a new principle, for the loading of empty barrels, and convenient for hay.

At the meeting of the Trustees in January 1793, the Committee appointed in November previous, reported a form of petition to the General Court for aid. From this petition, which is an elaborate argument in favor of affording legislative encouragement to agriculture, one extract will suffice. "Agri-

culture being the basis of those arts which sustain and embellish life, none, we conceive, can more properly receive the protection of government, none which lays a higher claim upon the patronage arising from the disposition of the Legislature to promote the best welfare of the State."

A letter was received from Thomas Lee, inclosing an additional check for one hundred dollars, as a donation to the Society.

At the meeting held on March 11, it was voted that a premium of fifty dollars in value be granted to the person who shall, on or before the first day of July, 1795, give the most satisfactory account of the Natural History of Canker Worms. Also, a premium of one hundred dollars, to the person who shall invent the most effectual and the cheapest method of destroying these insects. A Committee was likewise appointed to consider, and report the proper objects for premiums, together with the Rules and Regulations by which claims therefor shall be ascertained, and the following articles were submitted to them for consideration:

The object of manures, and a premium for the best specimen of marl.

The culture of wheat.

For the largest quantity of beef upon the fewest number of acres.

The greatest stock upon the least quantity of land.

The best vegetable food, other than hay, for the winter season.

The largest quantity, and the best quality of wool from the fewest number of sheep, not less than ———

For butter, cheese, flax, and salted provisions.

For the best process of making cider.

The improvement of wild land.

The best method of manufacturing maple sugar.

The best method of raising trees.

At the meeting of the Trustees, in April, this Committee reported for premiums, all the subjects thus referred to them, giving all the conditions in detail.

The following resolution was passed at this meeting:

"Whereas the Massachusetts Society for Promoting Agriculture expects that many persons will engage in Agricultural experiments, who would be more gratified by the most honorable testimony of their merit, than it is in the power of the Society to confer by pecuniary rewards, therefore, voted, that a medal of gold, that shall be equal to three guineas, emblematically engraved, called the Society's Gold Medal, be given to them, if they prefer the same.

A. D., 1793.

The Annual Meeting of the Society this year, was held at the Branch Bank of the United States. The following officers were chosen for the year:

THOMAS RUSSELL, *President.*
JOHN LOWELL, *Vice-President.*
MOSES GILL, *Vice-President.*
JOHN AVERY, JR., *Recording Secretary.*
OLIVER SMITH, *Corresponding Secretary.*
AARON DEXTER, *Treasurer.*
JAMES BOWDOIN,
LOAMMI BALDWIN,
MARTIN BRIMMER,
CHRISTOPHER GORE,
SAMUEL PARKER,
CHARLES VAUGHAN, } *Trustees.*

No other business was transacted, except the appointment of a Committee to audit the accounts of the Treasurer. It may be well to remark here, that this duty has up to the present day been regularly performed, and also that no bills or demands over $10, are ever paid by the Treasurer, without a special vote of the Trustees upon each particular claim.

At the meeting of the Trustees in June, the Committee appointed to collect materials for publication, laid before the Trustees a Pamphlet containing the Laws and Regulations, &c., names of the present officers and members, list of premiums

offered, with some interesting extracts from foreign and domestic publications, which were accepted and ordered to be printed. It was then voted that one Pamphlet be sent to each member, and one to each of the honorary members, and that the Corresponding Secretary be requested to distribute them ; also one to every clergyman of the Commonwealth, with a circular letter to be signed by the President and countersigned by the Secretary ; and that three hundred of the Pamphlets be sold at the prime cost, and be left at Mr. Isaiah Thomas's book-store, in Worcester, for this purpose.

At this period there was scarcely a meeting of the Trustees, at which there were not communications read in relation to the canker-worm ; and we are led to infer that this insect was a more severe pest even in that day than it is at present, bad as it now seems to be.

A. D., 1794.

At the meeting of the Trustees in January, 1794, a letter was received from Dudley Atkins Tyng, Esq., with a plan for setting on foot a subordinate society for promoting agriculture in the county of Middlesex, which was cordially responded to.

At the February meeting a Committee was appointed to consider the expediency of procuring a piece of ground for the purpose of agricultural experiments. Among other communications received at this time, was a comprehensive one from Mr. Calvin Bullock, upon the rise and progress of the canker-worms, the method of making maple sugar, the preservation of exhausted trees, the revival of a barked apple-tree, and a philosophical prevention of smoky chimneys.

At the general meeting of the Society this year, (Oct. 1794,) Dr. Tufts presented a species of marl, which was placed in the hands of a Committee, consisting of Dr. Tufts, Dr. Dexter, and Mr. Peck, to make experiments to ascertain its real quality, and report. The result of their observations was given in a report to the Society at its next semi-annual meeting.

A. D., 1795.

The officers and trustees of the Society of the last year were re-elected for the ensuing year. The number of members having greatly increased, it was voted at the annual meeting, that fifteen members should constitute a quorum, for choice of officers. At the semi-annual meeting, in October, it was voted to hold the annual meeting in June, in order that members from the country who attend the General Court might be present.

Another pamphlet, containing prize essays and other agricultural information was published this year. Several communications and essays were presented to the Trustees, relating to subjects for which premiums had been offered.

The premium of fifty dollars was awarded to the Rev. Mr. Whitney, of Shirley, for his Essay on Compost Manures; and the Secretary was ordered to publish it in all the newspapers; also an Essay on the same subject, for which a second premium of thirty dollars was awarded to Mr. Jesse Bannister of Brookfield. The premium of fifty dollars for an Essay on Canker-worms, was adjudged to William Dandridge Peck, of Kittery, and one of twenty-five dollars to Rev. Jonathan Newhall, of Stowe; also a premium of twenty-five dollars on the best and most expeditious method of destroying brush without ploughing, to a gentleman whose signature was "Farmer."

A letter was communicated from Newman Bruchenberg, giving an account, and accompanied with a sample of a new species of wheat, with an Essay on the culture of the same, by John Taylor. The Society voted to procure twenty bushels of this wheat for the use of the Society, and to publish the Essay on its culture in one or more of the Boston newspapers.

The sample of wheat which was sent by Mr. Bruchenberg was distributed in various portions among several of the members. At another meeting a letter was received from Thomas Austin Coffin, Esq., of Quebec, to the Secretary, informing him that he had forwarded half a barrel of Canadian wheat, to be divided among the members of the Society. This was also distributed among them in a similar manner.

A. D., 1796.

The officers of the Society for this year, were—

John Lowell, *President.*
Moses Gill, *Vice-President.*
Joseph Russell, *Second Vice-President.*
John Avery, Jr., *Recording Secretary.*
Oliver Smith, *Corresponding Secretary.*
Aaron Dexter, *Treasurer.*
Martin Brimmer, George Cabot, John Codman, Rev. Mr. Parker, Charles Vaughan, Theodore Lyman, *Trustees.*

The time of the stated meetings of the Society was changed to the second Wednesday in February, and the second Wednesday in June, at the latter of which, the officers were to be chosen. The annual assessment of two dollars upon each member was reduced to one dollar. Dr. Smith, the Corresponding Secretary, died this year, and his funeral was attended by the Society. New premiums were offered for various objects connected with agriculture, and many valuable communications were offered, some of which were published in the transactions. It was also voted to make an application to the Legislature, in behalf of the Society, to defray the expenses of printing such papers as the Society shall think calculated to promote agricultural knowledge; and that those who are entitled to receive the journals and acts of the Legislature, and each member of this Society, be furnished with a copy.

At a meeting of the Trustees it was voted that the Society's gold medal have, for its device, the seal of the Society on one side, and engraved on the reverse these words—Presented to (A—— B——,) 1796.

A letter was read from Rev. Jonathan Newhall, of Stow, to whom the gold medal had been awarded, requesting the Trustees, if they thought proper, to be pleased to perpetuate their generosity by some useful piece of plate, to the value of the

medal, and it was agreed to comply with his request, and in the place of the medal a silver cup was presented to him.

The Society's gold medal was awarded to Rev. Mr. Reuben Holcomb, of Sterling, for a premium essay on the cultivation of wheat, and a premium for an essay on improving wild land to Mr. Frederick Plympton, of Sturbridge.

A letter was afterwards received from Rev. Mr. Holcomb, dated Nov. 10, 1796, "expressive of the high esteem he takes of the approbation of the Trustees of the Agricultural Society for their favorable reception of his essay on the culture of wheat, and that he considers its principal value to consist in its being the expression of that benevolence which gave rise to their institution, and if it was their pleasure, that instead of the gold medal, a silver sugar bowl would be more agreeable to him, provided the value of a decent one should not exceed that of the gold medal voted him." The Trustees accordingly voted to accede to his request.

At the March meeting, 1797, Dr. Dexter, Rev. Dr. Parker, and Charles Vaughan, Esq., were appointed a committee to form a table of the times of the leafing and blossoming of forest trees and shrubs, and of the leafing, blossoming and ripening of fruit trees and plants; and to get such a number printed as they shall judge proper, and transmit them to such persons as they shall think capable of making observations upon the subject. Six hundred of these were afterwards printed, and were transmitted to each member of the General Court, and to others of scientific turn of mind.

A. D., 1797.

The place of Dr. Smith, deceased, was supplied at the June meeting of the Society by the choice of Jonathan Mason, Esq., of Boston, as Corresponding Secretary. The records of this year show a constant attention, on the part of the Trustees, to the objects of the Society, more particularly in obtaining and disseminating agricultural knowledge. The Society having

accumulated by gift and purchase, a considerable number of works on agriculture, a regular library was formed, the Corresponding Secretary was appointed librarian, and rules were adopted for using the books. As a specimen of the subjects upon which inquiries were made and information obtained, several communications might be named, which were handed to the Trustees from Hon. Mr. Bundey, of Nova Scotia, viz., "on the advantage of hoeing turnips; an experiment to determine the most profitable sort of sets, in planting potatoes; on the benefit of transplanting apple trees; the process and result of an experiment for ascertaining whether or not it is advantageous to cut potatoes designed for seed."

A communication was also received from William Russell, Esq., of Middletown, Conn., "on the success of an experiment (made by him) upon a small field of white wheat," and another from Mr. Joseph Cooper, of Cooperstown, N. J., upon the Hessian Fly. Also observations of Mr. Benjamin Vaughan, of Kennebec, "on preparing woodlands for cultivation, as practised in the vicinity of the Kennebec River."

A. D., 1798.

The only change made this year in the Board of Officers was the choice of Rev. John Thornton Kirkland, as Corresponding Secretary, in the place of Jonathan Mason. At the annual meeting it was voted to offer a premium, the amount of which is not stated, "to the person who shall ascertain by accurate analysis the constituent parts of several fertile soils respectively, and in like manner the parts of several poor soils, and thus shall discover the defects of the latter, and shall show by actual experiment how the said defects may be remedied, by the addition of earths or other ingredients which may be found in the country, and in a manner that may be practised by common farmers. And if it shall appear to the satisfaction of the Trustees, that upon an extensive practice, the improvement of

the poor soil would be more than equivalent to the expense of the improvement, the addition of one hundred dollars."

Other premiums were offered for various objects, in the course of the year, but this is cited for the purpose of showing how eminently practical and far-seeing were the aims of the Society, at this early period.

Another important subject occupied the attention of the Trustees, at this time, which has not since been neglected. This was the introduction of seeds, of various kinds, as well as varieties, new to New England. Votes like the following, are frequent upon the records of the Society:

Voted, That Dr. Dexter be requested to write to William Russell, Esq., to procure and send, by the first convenient opportunity, twenty bushels of Early Virginia Wheat.

Voted, That the Corresponding Secretary be requested to write to Mr. William Strickland, in England, requesting him to send several kinds of potatoes, such as the President shall think proper, and to draw upon Mr. Lane for the expense.

These seeds were distributed as generally as possible throughout the State. Communications were constantly received in competition for the premiums already offered, which were always referred to a Committee to report upon their merits, and if entitled to a premium, they were usually printed in the papers of the day, or placed in the hands of the publishing committee for the purpose of being printed in their transactions. Every effort was made in this way, to bring out information upon useful topics; and the Trustees themselves, were each called upon to furnish one article, "such as may be considered worthy of publicity," to be placed in the hands of the Publishing Committee. Many of these will appear in the re-publication of a portion of the Society's transactions.

A. D., 1799.

The only change in the Board of Officers and Trustees, was the election of Thomas L. Winthrop, Esq., in the place of Charles Vaughan, Esq.

An agricultural society was this year established at Sturbridge, the formation of which was announced by a letter from Dr. Babbit, and asking the advice of the Trustees, as to what books might be useful to the new society. The Corresponding Secretary was directed to send to Dr. Babbit such books as had been printed by the Society, and to loan him such others as might be wanted to promote the objects of the Society; likewise, to assure him "that this Society would be happy to co-operate with them, in any matter that will promote the object of their institution." The Corresponding Secretary was also directed to write to the Secretary of the Western Middlesex Agricultural Society, enclosing a number of the publications of this Society, and expressing its desire to co-operate with them by giving premiums for improvements, and publishing any of their valuable communications.

A list of questions similar to those now issued by the U. S. Patent Office, was printed this year, and sent to various parties throughout the State for answer. The number of queries amounted to forty-nine. Twelve hundred copies were printed and distributed, with an explanatory circular letter, signed by the President.

Mr. Lowell, in the concluding part of his letter, says: "The Society possesses means of causing useful information to be published and diffused, and to reward, in some degree, the efforts of the ingenious and industrious in any new attempts of improvement, which they have intrusted the Trustees with the application of. Our central situation, and nearness to each other, give us the advantage of frequently meeting, and receiving information. We do not, however, affect to disguise that our usefulness is, and will be, very much circumscribed without the aid of the practical farmer, and that it is only as an organ of information, that we can be extensively of importance."

It was this great advantage of frequent meetings, kept up to

this day, that undoubtedly induced the members of the Society to elect Trustees residing in or near Boston. There are but few farmers who can afford to devote twelve days in the year to meetings, and to give the time necessary to perform other duties devolving upon them, added to the expenses of travelling.

Wheat from Rio Janeiro, and potatoes from England, were distributed this year among the members.

A. D., 1800.

Several changes in the Board took place this year. They are given as follows:

JOHN LOWELL, *President.*
JOSEPH RUSSELL, *Vice-President.*
AARON DEXTER, *Second Vice-President.*
JOHN AVERY, JR., *Recording Secretary.*
JOHN T. KIRKLAND, *Corresponding Secretary.*
THOMAS L. WINTHROP, *Treasurer.*
MARTIN BRIMMER,
GEORGE CABOT,
THEODORE LYMAN,
SAMUEL PARKER,
FISHER AMES,
JOHN WARREN,
} *Trustees.*

Mr. Cabot communicated a description and a model of a mouldboard plough, extracted from a letter from Mr. Jefferson to Sir John Sinclair, President of the Board of Agriculture at London.

Mr. Elias Haskett Derby presented to the Trustees two bags of winter wheat, of excellent quality, from Naples.

Various communications in reply to circular and questions, were received. A second printed list of questions, amounting to fifty, was printed and circulated among the farmers in the State.

The Committee appointed the previous year, on several communications upon various subjects, from a gentleman who styled himself a farmer, reported "That they had with attention con-

sidered the several matters, and found nothing unusual in them; that our publications contained more information upon the subject of manures, than his letter No. 7; that his mode of making drains has not been published by the Trustees, but is contained in most of the late European books on that subject, and must in their nature be merely temporary. The Committee could not comprehend what he meant by the Slug-worm; but it had been a common practice, and well known to all our good farmers, that plowing their land in the autumn will have the best tendency to destroy any kind of worm. That his mode of planting forest trees, was as well kown here as in the Jerseys, therefore, the Committee were of the opinion that the gentleman was not entitled to a premium."

A communication on the subject of raising oaks and other forest trees from seed, by a gentleman whose signature is Z. was received, and it appearing that the author had raised near four thousand forest trees from the seed, three or four years old, it was voted that the author was entitled to the premium offered by the Trustees in 1798, provided the facts were properly substantiated. This premium was finally adjudged and paid over to Col. Robert Dodge, of Hamilton, to whom the signature of Z. belonged.

A few bushels of genuine Siberian Wheat, imported by Gorham Parsons, was presented by him to the Society for distribution.

A machine for sowing seed was exhibited to the Trustees for their inspection, and it was voted that the Corresponding Secretary be authorized to draw upon the Treasurer of this Society for five dollars to pay Mr. Kent for said machine, and that it be lodged with the Corresponding Secretary.

A. D., 1801.

There was no change in the Board of Officers this year.

A communication with the signature of Chelsea was presented to the Trustees, suggesting "whether if a fair was held on Cambridge Common in May and again in October, and small bounties given for certain articles mentioned, it would not be a spur to our brother farmers?"

This is the earliest suggestion found in relation to fairs, and the subject received much attention from time to time. The plan was not to have shows merely, but likewise that they should be stated and open markets for the sale of agricultural products.

A vote was passed this year subscribing five hundred dollars for the establishment of a professorship of Natural History at Cambridge, and a Committee was appointed to procure subscriptions for its permanent endowment and for the support of a Botanic Garden. This was the first movement which was made in this direction, and it ended in the establishment and endowment of the Professorship with the Botanic Garden as it now is.

This year witnessed the publication of the first of a regular series of papers, original and selected, on Agriculture. It contained a list of premiums offered by the Trustees, which, together with the preface, is worthy of notice, as representing the wants and deficiencies of those days, which are still far from being remedied. It is therefore inserted at length.

Preface.

To the Farmers of Massachusetts.

In presenting you with the following Papers, the Trustees of the *Massachusetts Society for Promoting Agriculture*, feel a sensible regret, that they do not comprise more original matter. After their repeated invitations to those who are engaged in agricultural pursuits to communicate to them "every hint, observation and experiment, relating to husbandry," they flattered themselves, that they should have been furnished with abundant matter for the present volume.

They, however, are much indebted to those gentlemen, whose communications are contained in the subsequent papers. To supply the deficiency of original information, they have had recourse to such printed works, as, in their opinion, will furnish the industrious farmer, with many hints for experiments, which may prove highly advantageous.

Among the papers that are original and American, the letter from Mr. Cooper is of the utmost importance. It has long been thought, that an exchange of seed from the south to the north, or from north to south, was absolutely necessary to insure a good crop. But from the experiments of that gentleman it clearly appears, that this necessity is superseded by a proper selection of the earliest, strongest and most flourishing stalks from which the seed for corn, wheat, rye, &c. should be taken, and the fairest and best favored roots. The Trustees, therefore, recommend an attentive perusal of that communication to every agriculturist.

An attention to the preservation of fruit trees, and particularly to the culture and management of orchards, is, at the present period, of the utmost consequence to the fruiterer and manufacturer of that wholesome and agreeable liquor,* which has become so necessary to the people of New England. If any of the papers in the following selection have a tendency to excite the public attention to this important object, the Trustees will be highly gratified.

But of all the subjects that require the serious consideration of the practical farmer, manures, and their proper application to different soils, are among the first. Upon this subject a proper attention has not yet been bestowed, though of primary importance, and upon which, in a great measure, in our climate and soil, the success of the husbandman depends.

Impressed with this idea, the Trustees have concluded that they could not furnish their readers with a more acceptable and instructive entertainment, than is contained in the copious extracts from a late report, presented by the Board of Agriculture in *England*, to our Society. It contains information from what various materials manures may be collected, their application to different soils, and the probable success arising from such judicious management. They cannot forbear to enforce upon every agricultural man a careful perusal of those extracts.

In respect to the premiums now offered, they beg leave to observe, that inasmuch as the canker-worm has in some places made its appearance again, it is judged proper to continue the premium for the most effectual and cheap method for its destruction, and also for that of the slug-worm.

The great consumption of wood and timber beyond the annual growth, must, in the settled parts of our country, soon leave us destitute of both, unless remedied by propagation, and must excite the serious concern of every friend to the public prosperity. To induce the farmer to cultivate forest trees, and particularly the oak, the Trustees have thought it expedient to offer a premium for raising, from the seed, such forest trees as are deemed the most useful; and they hope to see the time when no man will cut a tree from his land without planting two in its stead.

Should any thing contained in this publication prove beneficial to the interests of agriculture, or any way tend to promote that important science, the Trustees will think themselves well rewarded for their trouble.

* Cider.

Premiums offered by the Trustees of the Massachusetts Society for promoting Agriculture.

1*st.* To the person who shall discover an effectual and cheap method of destroying the Canker-worm, and give evidence thereof, to the satisfaction of the Trustees, on or before the 1st day of October, 1803, a premium of *one hundred dollars*, or the Society's gold medal.

2*d.* And a Premium of *one hundred dollars*, or the Society's gold medal, to the person who shall, on or before the 1st day of December, 1803, discover an effectual, and the cheapest method of destroying the *Slug-worm*, and give evidence thereof to the satisfaction of the Trustees.

3*d.* An annual Premium of *thirty dollars* for five years, to the person who shall introduce into the State of *Massachusetts*, for the purpose of propagation, a ram or ewe of a breed superior to any now in the State; if from a foreign country, *fifty dollars*. Claims to be presented on or before 1st of October annually.

4*th.* To the person who shall produce the largest quantity of wool, meat and tallow, from the smallest number of sheep, not less than one score, raised on his own farm, a premium of *thirty dollars*, to be claimed on or before the 1st day of August, 1804.

5*th.* To the person who shall, in one year, by a method new and useful, or that shall be an improvement on the methods already practised, make the greatest quantity of compost manure in proportion to the expense, to be of a good quality, and composed of materials common to most farms; the quantity to be at least two hundred tons, and the claim to be accompanied with a description of the yard or place, and the mode in which the same is made, a premium of *fifty dollars*, or the Society's gold medal. And for the next greatest quantity, being not less than one hundred tons, *thirty dollars*. Claims to be presented previous to the 1st of August, 1803.

6*th.* To the person who shall shew, by actual experiment, on not less than two acres, to the satisfaction of the Trustees, a new or improved, being the best and cheapest method, of introducing fine grass, fit for hay or pasture, into low fresh meadows, now producing coarse wild grass, or bushes, a premium of *thirty dollars*. Claims to be presented before the 1st November, 1804.

7*th.* To the person who shall discover any species of grass, not commonly cultivated or known, of a quality for the food of neat cattle or horses, equal or superior to those now in use, *fifty dollars*. Claims to be presented on or before the 1st October, 1804.

8*th.* To the person who shall exhibit distinct specimens of the greatest variety of grasses in general use, and specify, to the satisfaction of the Trustees, their respective qualities, productiveness and usefulness as food for different kinds of animals, a Premium of *fifty dollars*, to be claimed on or before the 1st October, 1803.

9*th.* To the person who shall produce from seed, the best growth of thrifty trees, not less than 600 in the whole, and in the proportion of 2400 to the acre, of any of the following kinds of forest trees, *viz.* oak, ash, elm, sugar maple, beech, black or yellow birch, chestnut,

walnut or hickory, *twenty-five dollars;* if all of oak, *fifty dollars.* Claim to be made on or before the 1st October, 1806.

10*th.* To the person who shall ascertain, by accurate analysis, the constituent parts of several fertile soils respectively, and in like manner the parts of several poor soils, and thus shall discover the defects of the latter; and shall show, by actual experiments, how the said defects may be remedied by the addition of earths or other ingredients, which abound in the country, and in a manner that may be practised by common farmers, *fifty dollars.* And if it shall appear to the satisfaction of the Trustees that, upon an extensive practice, the improvement of the poor soil would be more than equivalent to the EXPENSE of the improvement, the addition of *one hundred dollars.* A minute description of the several soils, and all the circumstances attending the processes, cultivation and results, will be required. Claims to be made on or before November, 1804.

11*th.* It is required that the Communications, for which the foregoing Premiums are offered, be accompanied with proper certificates from the Selectmen, Magistrates or Clergymen of the vicinity, or other vouchers, to the satisfaction of the Trustees; that they be delivered in without names, or any intimation to whom they belong; that they be severally marked in such manner as each claimant shall think fit; the claimant sending also a paper, sealed up, having on the outside a corresponding mark, and on the inside his name and address.

By order of the Trustees.

JOHN AVERY, Secretary.

A. D., 1802.

The same Board of Officers was continued this year.

A letter was received from Col. Humphries, late Minister to the Court of Spain, on the Merino Breed of Sheep, with a specimen of their wool, and remarks on the importance of propagating said sheep in the Northern and Eastern States. The letter mentioned that Col. Humphries had imported into Connecticut seventy-five ewes and twenty-five rams. The subject was referred to a committee consisting of Mr. Lyman, Mr. Cabot and Dr. Dexter, to consider the same and report thereon.

The introduction of Merino Sheep may be dated from this time, and so important it seemed, that at the next meeting of the Trustees, after Col. Humphries' letter was received, the question was raised whether Col. Humphries should not receive

the gold medal, for his services, and at the following meeting it was awarded to him, not to exceed fifty dollars in value. A premium had already been offered to the person who should introduce Merino Sheep into the country, and the amount paid in this way was very considerable. The first claimant for this premium was Seth Adams, for the importation of two Sheep, of the Merino breed, from France.

The premiums offered by the Trustees, published in a pamphlet in the year 1801, were taken into consideration, and it was voted that the articles Nos. 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, be reprinted in the publication which was about to be made. An amendment was proposed in the 3d article, as follows, viz.: An annual premium of $30, for each year previous to 1806, to the person who shall introduce into the State of Massachusetts, for the purpose of propagation, a ram or ewe, of a breed superior to any in the State at the time they are introduced; if from a foreign country, the premium should be $50.

The Corresponding Secretary informed the Trustees that, "after a very great exertion, he had procured a few copies of the publications of this Society, and had them bound." This fact shows how readily they had gone into general circulation and use.

A. D., 1803.

There was no change in the Officers of the Society.

A letter was received from Mr. Peter Halloway, respecting the making of cider, and several suggestions in regard to the expediency and importance of importing certain grains from Europe; and it was voted that the Corresponding Secretary be requested to return an answer to Mr. Halloway, and to inform him of the pleasure afforded to the Trustees by his attention to the subject of his communication, and to transmit him one of the late publications of the Society.

A Committee, consisting of Hon. George Cabot, Dr. Aaron Dexter, and Rev. Dr. Kirkland, was appointed to collect materials for publication.

Theodore Lyman was desired to import from England, for distribution, one hundred pounds of foxtail grass.

A letter was received from Ward Nicholas Boylston, in relation to the rose-bug, and the method of destroying it.

A Committee was appointed, at the request of Mr. Joseph Swazey, of Newburyport, to examine a Patent Machine for shelling Indian Corn, on a new and improved method.

A premium was offered "to the person who shall, by actual experiment, on a quantity not less than half a ton, show the best method of curing clover hay with salt, regard being had to the quality of the hay, the saving of labor, and the shortness of time between cutting it, and packing it in the mow."

A summary of observations made on the leafing and flowering of trees near Boston, and on the first specimens of ripe fruit and esculents, was presented by James Winthrop, Esq., of Cambridge.

The Committee on Publications reported that they had prepared, and put into the hands of the printer, materials for a book, consisting of communications to the Society, and selections from a variety of printed works, on Agriculture.

The articles in this number are varied, and most of them short, as will be seen by the following

Table of Contents.

The Preface is worthy of notice in a history of agricultural progress, and is therefore inserted.

Preface.

The Trustees of the Massachusetts Society for promoting Agriculture offer the public their collection of papers for 1804, being the 7th number of their publications. The pamphlet consists of a few original communications, believed interesting and seasonable, and of selections from foreign works adapted to the use of cultivation in this country. It will be remembered that the object and duty of the Board is to convey to practical farmers through the press, the agricultural information which they receive or learn from others. Whilst on this account, they are not responsible for the accuracy of every statement or the justness of every opinion contained in their books, they mean to insert nothing, which is not recommended by the appearance of novelty, ingenuity or utility. They are satisfied the series of papers, which they have laid before the public, including the present pamphlet, will be found to contain, not only some highly interesting articles of natural history, but valuable hints and facts respecting several of the leading parts of husbandry. Though in many instances the methods of cultivation in use may be the best which, considering the capital of the farmer, the comparative value of labour and land, and other circumstances, can be adopted, yet in other instances much room exists for improvement. It cannot be doubted that information conveyed in printed works may be subservient to the correction of errors in opinion and practice, and to the diffusion of good modes of culture.

Those who take the trouble to prepare this publication are aware, that in this subject theory is good for nothing till sanctioned and confirmed by experience; that old modes of husbandry ought to be held in respect and changed with caution and moderation,* and that *farming by books* merely, is justly derided. At the same time they are convinced that Agriculture derives aid from the discoveries and labours of the philosopher, the naturalist and the chemist; that principles grow out of practice; and that inquiry is the road to improvement. They have no more respect for a bigoted attachment to injudicious customs, than for a rash spirit of innovation; nor can they ascribe wisdom or modesty to those, who think their own practice comprises all that is or can be known, and refuse to read printed documents, which relate the observations and experiments of others.

The different results of the experiments on *potatoes*, as related in the two first papers of this collection, will naturally excite attention, and probably put those, who are not satisfied about planting large or small potatoes, eyes, or cuttings, upon further trials of the different methods.

* "Nor thou the rules, our fathers taught, despise,
Sires by long practice and tradition wise."
Sotheby's Trans. Georgics, b. i. v. 115, 116.

The observations on the *progress of vegetation*, in the next paper, comprise a part of natural history, which is evidently applicable to the use of agriculture. A sufficient number of notices of this kind would afford the best sort of almanac for regulating seed time. It is hoped gentlemen in various parts of the country will frame and fill up similar tables. Where the several trees, shrubs and plants, here mentioned are wanting, they may be supplied by other kinds. The field or the wood will compensate the deficiency of the garden.

We publish a new confirmation and illustration of Mr. Cooper's doctrine and practice, respecting *seeds*, as related in a letter of his in a former number, and it is to be wished that every farmer will endeavour to test and be able to verify them for himself.

The sketch of *soils and manures* must be useful to all who would have the habit of discriminating the several species of each, and adapting culture accordingly; and the analysis of *lime* and *marl* requires so much knowledge of chemisty only as can be learned and applied by the common farmer. The treatise on the culture and preparation of *hemp* being intended for the inhabitants of Canada, is of course applicable to our instruction.

The efficacy of *salt in curing clover* is proposed to the serious attention, and the careful experiments of farmers. The documents here published will show how much reason there is to expect it will be found highly beneficial; and the *premium* offered by the Trustees, is added to other inducements, for giving it further trials.

The files of the Society contain a number of sets of answers to Agricultural Questions sent out by the Trustees some years ago. They delay making use of what they have in hopes of more. Will farmers, into whose hands they are put, favour them with their answers, that they may proceed to give the public the information received either entire or digested? For this and other assistance in fulfilling their office, the Trustees look not only to intelligent individuals, but to the agricultural associations in different parts of the State, to some, or most of which they are already indebted; and to one for the first document in this pamphlet.

In the name of the Society, the Trustees repeat their request to these associations for original communications, and their assurances of ability and readiness to publish for their and the general benefit whatever novel, interesting or seasonable matter, they shall put at their disposal.

The observations of Mr. Winthrop are likewise inserted, and every reader will probably join in the wish that similar tables had been continued to the present day.

Observations of the Progress of Vegetation, made at Cambridge, *from* 1793 *to* 1796, *inclusive; by* James Winthrop, *Esq.*, F. A. A. *and* F. H. S. *and of the Agricultural Society.*

Table I. Time of Blossoming.

Plant.	1793	1794	1795	1796
Asparagus,	15 May	15 May	6 June	
Apple,	29 April	29 April	10 May	4 May
Apricot,	16 April			
Currant,	20 April	23 April	5 May	24 April
Cherry,	17 April	23 April	6 May	27 April
Elm,	27 March	7 April	4 April	8 April
Gooseberry,	12 April	23 April	1 May	23 April
Grape,	16 June	22 June	25 June	24 June
Honeysuckle,	15 May	15 May	27 May	21 May
Lilac,	7 May	4 May	15 May	13 May
Lime,	27 June		29 June	26 June
Lily,	19 June		29 June	28 June
Nectarine,	15 April			29 April
Horse Chestnut,		15 May	16 May	
Peach,	20 April	23 April	27 April	23 April
Pear,		29 April	10 May	
Plum,	16 April	19 April	7 May	30 April
Quince,	11 May	11 May	25 May	18 May
Tulip,		5 May	10 May	12 May
Raspberry,	22 May		1 June	1 June
Pink,			1 July	24 June
Willow,	16 April	19 April	27 April	22 April
Black Poplar,		17 April		21 April
Syringa,	22 May	27 May	4 June	30 May
Dama. Rose,	7 June		14 June	15 June
White Rose,	23 May	20 May	10 June,	1 June
Oak,	11 April	18 April	24 April	22 April
Birch,	29 April			18 April
Maple,		18 April		17 May
Button,		27 April	7 May	
Ash,			24 April	
Snowball,			15 May	15 May

By the blossoming of the Buttonwood, is intended only the opening of the bud, so as to discover the ball; for the tree, in reality, does not discover its blossom to an observer.

TABLE II. Of first open Leaves.

Plant.	1793	1794	1795	1796
Apple,	9 April	18 April	24 April	22 April
Apricot,		28 April	7 May	23 April
Currant,	25 March	24 March	24 April	10 April
Cherry,		19 April		27 April
Elm,	6 May	1 May	8 May	6 May
Gooseberry,	25 March	3 April	17 April	10 April
Grape,	9 May	3 May	10 May	29 April
Honeysuckle,	28 Feb.	23 March		8 April
Lilac,	28 Feb.	January	17 April	10 April
Lomb. Poplar,	29 April	21 April	7 May	29 April
Peach,		21 April		27 April
Plum,	13 April	19 April	2 May	23 April
Blk. Poplar,	12 April	19 April	7 May	23 April
Quince,	11 April	19 April		1 May
Rose,	beg. April	January	April	March
Raspberry,	25 March	24 March		8 April
Strawberry,	beg. March	January	April	March
Syringa,	7 April	3 April	17 April	16 April
Willow,	4 April	18 April	17 April	16 April
Pink,	beg. April	January		March
Lily,	11 April	January	1 April	March
Snowball,	6 April	21 April	25 April	23 April
Oilnut,	20 April	22 April		3 May
Oak,		1 May	11 May	
Mulberry,		5 May		
Wh. Mulberry,	12 April	21 April	10 May	4 May
Asparagus,	24 April	25 April		23 April
Lime,	1 May	2 May	9 May	5 May
Button,	6 May	1 May	7 May	1 May
Horse Chesnut,		21 April	27 April	1 May
Tulip,		1 April	April	1 April
Althea,				22 May

Several of these plants put out their leaves so early as to lose them again by freezing. Such plants seem rather to be nourished than injured by hoar frost, and unless the freezing be very severe and followed by sudden heat, their leaves do not appear to suffer materially from the freezing degree of cold. They will for a little while bear a degree of cold several degrees below freezing.

TABLE III. Containing several ripe fruits and esculent plants, according to the first specimens in each year, as I met with them in my own garden or elsewhere.

Fruit, &c.	1793	1794	1795	1796
Asparagus,	15 April	20 April	26 April	24 April
Strawberries,	27 May	27 May	11 June	3 June
Peas,	28 May			12 June
Cherries,	29 May		June	
String-beans,	15 June			27 June
Raspberry,	26 June		3 July	
Turnips,	20 June			
Apricots,	1 August	24 July		
Nectarine,				6 Septem.
Peaches,	15 August	20 August		6 Septem.
Plums,	August	August	29 August	3 Septem.
Melons,	August	15 August	20 August	27 August
Grapes,	30 August	28 August	12 Septem.	17 August
Gooseberries,		16 July	July	July
Currants, red,		25 June	29 June	26 June
white,		25 June	25 June	28 June
black,		16 July	August	

If these minutes had been originally made with a view to publication, I would have taken care to fill the blanks. They are, however, more numerous, and placed in a more compact form, than any others that I have seen, and I hope they will be the means of stimulating some of our associates to bring forward their observations, that by a comparison we may endeavor to bring this branch of knowledge to perfection.

The preceding observations chiefly relate to those plants which have a perennial root. They may be of use to determine when the ground is warm enough to receive the seeds of annual plants. With respect to these, it is of importance that we should know at the time of planting, when we may reasonably expect them to be in eating. Unless we are careful to multiply and vary our experiments, and to publish all of them that come to our knowledge, we can never hope for a regular succession of fresh vegetables, which is the perfection of a garden. It is to contribute toward so desirable an end, that the following experiments are communicated, and I hope, by the United endeavors of our Society, with other institutions of the same kind, that we shall have agriculture as much a subject of calculation as astronomy is at present.

TABLE of the growth of Indian Corn, and the number of days from planting for each period of growth.

Planted.	*Sprouted.*	*Tasselled.*	*Silked.*	*Eatab. green.*	*Season.*
1792 May 4	12 May 8	30 June 57	14 July 71	1 Aug. 89	*very dry.*
1793 April 23	6 May 13	26 June 64	10 July 78		
26	8 May 12	19 June 54	5 July 70	23 July 88	
27	8 May 11	21 June 55	5 July 69		
July 15	22 July 7	24 Aug. 40	15 Sept. 61	10 Oct. 86	*excessive dry.*
1794 May 3	15 May 12	27 June 55	12 July 70	29 July 87	*not very dry.*
June 21	28 June 7	28 July 37	13 Aug. 53	1 Sept. 72	
1796 April 27	15 May 18	10 July 74	24 July 88		

The principal circumstance which caused any difference of growth, appears to be the time of planting. What was planted about the beginning of May, appears to have required from 86 to 89 days to be fit for eating. What was planted earlier, took longer time to come forward, and did not ripen at so early a date as that at the beginning of May. That planted in July lost in the fall the time it gained in summer, and furnished green corn for the beginning of October. The specimen planted about the middle of June, kept its growth the whole summer, and became fit for eating in 72 days. Not much appears to depend on the character of the season.

Summary of observations made on the leafing and flowering of trees, near Boston, *and on the first specimens of ripe fruit and esculent vegetables, from* 1797 *to* 1803, *inclusive, by* JAMES WINTHROP.

Tree or Plant.	*First Leaves.*	*First open Flowers.*
Almond,		13 April
Althea,	22 May to 5 June	
Apple,	28 April to 5 May	28 April to 15 May
Apricot,	23 to 29 April	20 April to 4 May
Asparagus,		
Ash,		26 April
Birch,		19 April
Button,		7 May
Cherry,	19 April to 4 May	25 to 29 April
Currant,	31 March to 3 April	28 April to 14 May
Elm,	4 to 11 May	31 March to 18 April
Fig,	23 May	
Filbert,	2 to 4 May	
Gooseberry,	31 March to 3 April	27 April to 7 May
Grape,	3 to 22 May	20 June to 2 July

Summary of observations,—continued.

Tree or Plant.	*First Leaves.*	*First open Flowers.*
Honeysuckle,	21 March to 8 April	21 May to 8 June
Horse Chestnut,	1 to 10 May	14 to 24 May
Larch,	1 May	
Lilac,	2 to 4 April	10 to 16 May
Lime,	3 to 8 May	21 to 30 June
Lily,	31 March to 5 April	28 June to 6 July
Locust,		12 June
Maple,		20 April to 2 May
Mulberry blk.	5 May	30 May
Mulberry wh.	4 to 18 May	26 June
Nectarine,	30 April	20 April to 14 May
Oak,	10 to 15 May	16 to 23 May
Oilnut,	3 to 8 May	June
Passion Flower,		7 July
Peach,	10 to 30 April	20 April to 13 May
Pear,		4 May
Pink,	March	29 June to 8 July
Plum,	1 to 8 May	25 April to 14 May
Poplar,	2 to 10 May	20 to 24 April
Quince,	1 to 15 May	21 to 31 May
Raspberry,	3 to 8 April	28 May to 2 June
Rose, damask,	12 April to 1 May	9 to 18 June
Senna,	15 May	21 June
Snowball,	25 April to 4 May	15 May to 1 June
Strawberry,	March	27 April to 17 May
Syringa,	3 to 19 April	28 May to 8 June
Tulip,	27 March	14 to 21 May
Walnut,	3 to 16 May	
Willow,	4 to 15 April	23 April to 8 May

First Specimens of Fruits and Esculent Vegetables, from 1797 *to* 1803 *inclusive.*

Asparagus,	21 to 30 April	Melons,	15 to 27 August
Almonds,	18 Sept.	Nectarines,	6 Sept. to
Apples,	August	Peaches,	15 Aug. to 6 Sept.
Apricots,	12 to 13 Aug.	Plums,	26 Aug. to 3 Sept.
Cherries,	29 May to	Raspberry,	4 to 9 July
Currants,	25 to 29 June	Strawberry,	27 May to 3 June
Gooseberries,	16 July	String Beans,	15 June to 3 July
Grapes,	22 Aug. to 12 Sept.	Peas,	28 May to 12 June

A. D., 1804.

In the Board of Officers, Samuel W. Pomeroy, Esq., was elected a Trustee in the place of Rev. Dr. Kirkland, who became Corresponding Secretary in the place of Rev. Dr. Parker.

This year was especially marked by the permanent establishment of the Professorship of Natural History, at Cambridge. A special meeting of the Society was called on the 6th of March, for the purpose of considering the articles to be proposed by the Proprietors of the Botanic Fund, when the rules for the foundation of the Professorship, and the principles by which it should be regulated and conducted, were agreed upon. The Trustees were constituted the Visitors of the Professorship. The original design was to establish a Professorship of Botany and Entomology. This was changed to the one finally adopted, by a formal vote of the Trustees, who voted to accept the trust reposed in them by the rules of the foundation.

Twenty copies of the late publications of the Society were voted to be sent to the Rev. Dr. Wheelock, President of Dartmouth College, and twenty copies to Dr. Nathan Smith, of Windsor, in the State of Vermont,—to be distributed by them according to their discretion.

A communication from John Lucas, Esq., respecting an experiment he made upon twenty-four acres of meadow land in Cambridge, by spreading a certain quantity of gravel upon the same with a mixture of compost manure, and mentioning the advantage of it, was read and referred to the Committee on Publications.

A general rule was adopted for distributing copies of the agricultural publications of the Society to all the agricultural societies in the United States.

A committee was appointed to call up in the Senate the petition for the promotion of the Botanical Institution, and to obtain such aid from Government as they shall be pleased to grant.

Dr. Aaron Dexter communicated a letter from Rev. Manasseh Cutler, a member of Congress, recommending the purchase of Michaux on the American Oaks, Michaux's Flora Boreali Ame-

ricana, and Willdennois' new edition of the Species Plantanum, which were accordingly ordered to be purchased.

Mr. Daniel Adams, of Framingham, having submitted a plan for a periodical publication on the subject of agriculture, it was taken into consideration, and it was voted: That it does not consist with the rules invariably prescribed by this Society to lend its official sanction or to become responsible for any publication not under its control, or make any private enterprise of this nature the vehicle of its communications to the public; but should the work intended by Mr. Adams appear on perusal to promote the great purposes of agriculture, the Trustees individually, and the Society at large, will feel it their duty to encourage its circulation by all the means in their power.

A committee was appointed to consider and report the best means to be adopted for availing the Society of the benefits of a Resolve of the General Court, passed March, 1805, granting to the Society a township of land.

At the meeting of the Trustees on the 13th of April, 1805, the Trustees entered upon the duties prescribed in the foundation of a Professorship of Natural History.

At the meeting in May, Joseph Russell and Dr. Dexter were appointed a committee to offer for sale the township of land granted by the State, by advertising for written proposals to purchase the same, in one or more of the public newspapers printed in Boston. This Committee reported that they had received an offer of sixty-two and half cents per acre, which was accepted by the Trustees, provided the purchasers comply with the conditions expressed in a written memorandum covering the offer.

A. D., 1805.

Hon. John Adams, (Ex-President of the United States) was chosen President, in the place of Gov. Strong. Dudley Atkins Tyng and Josiah Quincy took the places of George Cabot and Martin Brimmer.

The Committee appointed for the sale of the township of land granted by the Legislature for a Professorship of Natural His-

tory, reported a letter of instructions to Lothrop Lewis, and a reply from him in relation to surveying said grant, in which he says that the lateness of the season and his avocations were such as to prevent his undertaking it until spring.

A letter from Hon. Timothy Pickering, on the culture of potatoes from the sprouts, and one from Mr. William Bartlett, of Newburyport, upon Egyptian millet, were read and considered. Letters were likewise received from Benjamin Vaughan, upon the cultivation of the potato in England by the Millwood family, also an account of a cottager's cultivation in Shropshire; from Nathaniel Adams, upon the cultivation of a new species of grain, called Jerusalem wheat; from Paul Dodge, of Newcastle, (Maine) enclosing a description of a cider-press; from Justin Ely, on the culture of "the long crooked-necked warty squash;" from Dr. Dexter, one "on the food of plants." These were all considered, and in some form brought before the public.

The sum of five hundred dollars was paid to the fund for the Professorship of Natural History.

A. D., 1806.

Rev. William Emerson was this year elected one of the Trustees, in the place of Hon. Christopher Gore; and Dudley Atkins Tyng was made Secretary, in the place of John Avery, jr., deceased. John Lowell, Esq. was chosen Corresponding Secretary, in the place of Rev. Dr. Kirkland, who continued in the Board of Trustees.

A committee was appointed at the semi-annual meeting of the Society to consider the expediency of offering a premium for the best system of kitchen economy and cookery adapted to the use and habits of the yeomanry of Massachusetts.

At the meeting of the Trustees held at Mr. Theodore Lyman's, in Waltham, Mr. Winthrop presented to the Society, from Hon. James Bowdoin, Minister of the United States to the Court of Madrid, sundry books and pamphlets on agriculture; also specimens of earth brought from the mountains of Limoye,

in France, of which the Sevres and Angouleme porcelain is made. These specimens were committed to Dr. Dexter.

A specimen of Jerusalem wheat, from Prof. Peck, was committed to Mr. Pomeroy.

A communication was read from Rev. Dr. McClure, of Windsor, Conn., on the use of pomace as a manure, and on clearing the tops of hills.

A. D., 1807.

Hon. Joseph Russell retired this year from the office of Vice-President, and Theodore Lyman was elected in his place. Eben Preble, Esq., was elected one of the Trustees.

At the semi-annual meeting of the Society, held in February, Thomas L. Winthrop, Theodore Lyman, and Samuel Parkman were appointed a committee to present a petition to the Legislature, for the grant of half a township of land, in aid of the funds of the Massachusetts Professorship of Natural History.

Messrs. Pomeroy, Lowell, and Emerson, were chosen the Committee on Publications.

A letter from Hon. Josiah Quincy, accompanying a pamphlet on the "management of thorn hedges," by Mr. Main; a letter from Mr. Thomas Bremer, accompanied with a present of Patagonian wheat; an Address of the Kennebec Agricultural Society to the farmers on the river Kennebec, on the means of increasing food for cattle; a letter from Col. David Humphries, describing the progress he had made in propagating the Merino breed of sheep, and another accompanied with a small parcel of barley; also a letter from Hon. Dwight Foster, enclosing sundry communications to the Brookfield Agricultural Society; were read and considered at the several meetings of the Trustees during the year.

The Trustees published another volume of transactions during this year, "under the patronage of government;" as appears by the following brief preface.

Preface.

Under the patronage of Government the Trustees of the Massachusetts Society for promoting Agriculture, and the Board of Visitors of the Massachusetts Professorship of Natural History, offer to the Public the tenth number of their Papers.

The answers to queries, sometime since proposed to practical Farmers in the Commonwealth, of which we shall hereafter more particularly speak, form the principal portion of the original matter contained in this number.

The high reputation of the *Farmer's Magazine*, periodically published in *Edinburgh*, and the probability that few agriculturalists in this country have an opportunity of reading it, together with the want of domestic communications, have induced the Trustees to make copious extracts from that valuable work.

"Hints regarding Cattle," will be deemed interesting by the intelligent Farmer, who cannot but have observed the general inattention to the subject on which they are suggested.

The papers on "The management of dung," and "the culture of potatoes," although, perhaps, alluding to practices not common in New England, are well worth a preservation in these pages.

Extracts from the celebrated Fourcroy, "On the philosophy of vegetation," translated and abridged for the *Farmer's Magazine*, are suited to awaken the attention of husbandmen to different soils, and their particular adaptation to different vegetables.

The letter "On the benefit which farmers would derive from the study of Botany," is not so intelligible as it would be, if the publications to which it refers were annexed; but it may serve to excite a curiosity in those who have leisure to obtain an acquaintance with this subject.

The answers to queries in a digested form, occupy thirty-seven pages of the volume, and are replete with interest; and if it is found that it will not extend this work too much, the entire article will be added at the close of the volume.

A. D., 1808.

The Board of Officers and Trustees continued the same as the last year.

At the meeting of the Trustees on the 25th of June, it was voted that the Secretary of the Commonwealth be requested to make and to execute to Dudley A. Tyng, Esq., the conveyance of a township of land authorized by the General Court in 1805.

Messrs. Lowell, Dexter and Winthrop were authorised to correspond with the persons who heretofore contracted with this Board for the said township, and to make any new contract, if needful, with them, or to rescind the same, at their discretion; in such an event to sell it for cash, credit, or exchange, as they may think best, at their discretion.

A communication on the raising of potatoes, from Caleb Stark; and one from Elkanah Watson, with enclosures, asking aid of the Board for printing the same, were received. The Corresponding Secretary was requested to inform the latter that if upon examination of his manuscripts the Trustees approve of the same, they will print them free of expense to him, and will forward to him such a number of copies as he may wish to distribute.

There was presented to the Society this year, by Sir John Sinclair, "A plan of the reprinted reports of the Board of Agriculture in Scotland;" also, the first volume of the "Memoirs of the Agricultural Society of Philadelphia" was received from that society.

A list of premiums was reported to be published in the next volume of the Transactions of the Society. The aggregate amount of the premiums was more than one thousand dollars. One of them was "To the person who shall import into this Commonwealth, directly from the Kingdom of Spain, the first five rams of the Merino breed, the sum of fifty dollars, each, and for the first ten ewes, the sum of twenty-five dollars each.

The other premiums related to the destruction of Canker-worms, Slugs, &c.; the raising of wool and mutton; the best method of raising water for irrigation; the best *Hortus Siccus* exhibiting the different kinds of grasses and their respective qualities; the best plantation of oaks and other hard-wood trees; the best analysis of soils; best method of curing clover hay; best experiment of ploughing in green crops for manure; best essay on the application and effects of manures, &c.

A. D., 1809.

Theodore Lyman retired from the Board and S. W. Pomeroy was elected Vice-President in his stead. Rev. J. T. Kirkland became Recording Secretary in the place of John Lowell, and Peter C. Brooks, and Samuel G. Perkins were added to the Board of Trustees.

A letter from Col. Robert Gardner on raising coffee in this State was received and referred to the Publishing Committee.

A committee was appointed to take into consideration the state of the finances, and report on the expediency of devoting any part thereof to the purchase of books, models, &c., for the use of the Society. Subsequently an appropriation of five hundred dollars was made for this purpose. It was also voted that the books procured for distribution should be placed under the care of such *associations for improving the husbandry of the country*, as now exist, or hereafter may be formed in this Commonwealth.*

Papers from Mr. Lowell, on the early maturation of grapes; from R. B. Livingston, on the advantages of rearing Merino sheep; from Mr. Mansfield, with remarks on agriculture; a memoir on the use of Palmetto plank for sheathing; were laid before the Trustees.

The Committee on Publications was requested to publish, in the newspapers, the best short account to be obtained of the peculiar marks of the Merino sheep.

Capt. William Bartlett received a premium of fifty dollars for the importation of a Merino ram.

The volume of Transactions, which was issued this year by the Trustees, appeared under the title of the "Georgick Papers for 1809," with the following motto:

"Without encouragement of agriculture, and thereby increas-

* It may be well to remark that the Library of the Society has lately been placed under the charge of the Secretary of the Board of Agriculture, at the State House; and as many valuable books belonging to the Society have been lost under the old system of management, it is hoped by the Trustees, that if any of these should be found and identified, they will be returned to Mr. Flint, the Secretary of the State Board of Agriculture.

ing the number of its people, any country, however blessed by nature, must continue poor."—SWIFT.

The following Preface, together with much of the original matter, was evidently written by Hon. John Lowell.

PREFACE.

ALTHOUGH in their papers for 1809 the Trustees of the Massachusetts Society for promoting Agriculture are unable to number many original communications, they, however, hope that their selections will be found adapted to the design of the Institution.

The intimate connection subsisting between chemical knowledge and improvements in husbandry is well known to intelligent farmers, and is an obvious reason for devoting many of the following pages to an extract on the nature of vegetables. By knowing the operation of different substances upon each other, we learn what is the proper food of plants, and, of course, how most successfully to cherish their growth.

The art of improving and managing breeds of cattle and sheep begins to exercise the attention of wealthy and patriotick landholders, who thus give promise of serving at once the agriculture and manufactures of the nation. In this view, Lord Somerville's memoir to the Bath Society, and the elegant letters of Col. Humphreys, on the habits and excellence of the Merino Sheep, will be no less interesting to the American Publick, than they are creditable to their authors. The disposition of the Trustees, also, to encourage the propagation of the Merinos in this country will be seen by the premiums which they offer to importers.

The naturalist will be amused, perhaps instructed, by the history of the Curculio and of the Mole. The tract on the latter is a translation from an ingenious French writer; and though the depredations of this animal are not the subject of general complaint in this part of the country, yet it is elsewhere troublesome and destructive.

The badness of the butter, usually marketed in this vicinity, frequently excites disgust and murmurs. In the hope of doing somewhat towards remedying the evil, the Trustees have this year republished a paper, which they published in 1793, containing Dr. Anderson's aphorisms on the management of a dairy.

The extract from Mawe is made for the benefit of those who are destitute of the work itself, and of the still more useful treatise on the same subject by M'Mahon: but the American gardener must recollect, that the difference between the seasons here and in England is considerable.

The valuable communication from Kennebec, and several miscellaneous articles, entitle the gentlemen who furnish them to the thanks of the publick.

The Trustees, in superintending the concerns of the Society, have no objects in view other than those which should inspire a deep and common interest, the immediate improvement of husbandry, the relative advancement of the arts, and the ultimate prosperity of the

country. As it was the original design of their Association, so it is still their desire and purpose to encourage by suitable premiums an attention to agricultural pursuits; to throw into the publick stock the knowledge of such useful improvements as they may severally possess; and to procure models of approved machines to be examined and imitated. It is evident, however, that these objects cannot be completely attained without farther legislative aid, than they already enjoy, and a spirit of more liberal inquiry and communication among practical farmers, than has yet been manifested. On the last article, particularly, therefore, they beg leave most earnestly to repeat a request, which they formerly made, that farmers in the interior and distant parts of the Commonwealth would favor them with original communications. It is by no means necessary that a man, profitably to write for this work, should be intimately acquainted with the structure and character of plants, or with the modes of farming in foreign countries, or with the ornaments of style, or with even the rules of grammar. Plain facts in plain language; journals of labor performed, and of the time and manner of sowing the same seeds in different grounds; and hints on probable improvements in the tillage of old farms, and the subduing of new ones—will ever be acceptable to the Trustees, who, to the best of their power, will methodize such facts and observations, and publish them for the general benefit.

Boston, May 24, 1809.

A. D., 1810.

Dr. Warren and Rev. William Emerson having resigned, they were succeeded by John Prince and Rev. J. S. Buckminster.

The fourth article of the Constitution was altered at the annual meeting, making nine members to constitute a quorum at the semi-annual meeting of the same year. A quorum not being present, no business was transacted. Since that period the semi-annual meeting has been discontinued, except upon the occasion of cattle shows.

The Committee appointed for the sale of the two townships of land granted by the Legislature, in aid of the Massachusetts Professorship of Natural History, reported:—

"Having caused the said lands to be duly advertised in the Columbian Centinel, for more than six weeks before the time of sale, and also in two other papers printed in Boston, during the

week preceding the time of sale, and having selected, as the time of disposing of the same at auction, the 5th day of June instant, when the two branches of the Legislature were in session, and gentlemen of all parts of the State were assembled in Boston, and having, for the sake of giving greater publicity to said sale, adjourned the auction, from the 5th day of June to the 12th of the same month, at which time the same Legislature was in session, they caused the same to be put up at auction, when they were obliged to bid in, for the account of the Professorship, the *located township*, no real purchaser appearing to pay any price whatever. They then set up for sale the *unlocated township*, and the same was purchased by Abiel Wood, Jr., Esq., of Wiscasset, at the rate of thirty-two cents per acre, which amounted, for the township, to six thousand, nine hundred and sixty-nine dollars. The Committee, after due inquiry, took his note, payable in five years, with interest yearly, and gave him a contract for a deed, when the same shall have been located, he giving a mortgage of the premises to secure his note.

"The Committee convinced from inquiry, as well as by the aforesaid ample trial of said property at auction, that they had ascertained the value thereof, did, thereupon sell the *located* township to Dr. Aaron Dexter, and Eben Preble, Esq., for the sum of seven thousand dollars, they having frequently and very honorably expressed their readiness to give up said purchase, in case any member of the Board shall think said sale disadvantageous to the public."

The report was immediately accepted, approved and recorded, and it was voted that Dudley A. Tyng, in whom the title was invested, be authorized and requested to convey the same, in fee simple, to Messrs Dexter and Preble, upon the purchase money being paid, or secured to the Treasurer of Harvard College.

It was also voted that the purchaser be requested to call the township *Linnæus.*

F. C. Lowell, Secretary of the Subscribers to the Funds of said Professorship, laid before the Board an exemplification of the foundation, rules and principles of the same, engraved on parchment, under the signature of the Chairman and Secretary.

A Committee on the Canada thistle was appointed.

Dr. Dexter was authorized to send to England for a newly invented plough, making it a condition to his correspondent that the plough has been found to answer a useful purpose, and that the invention is an improvement.

Mr. Pomeroy was requested to have printed instead of the pamphlet commonly published annually by the Trustees, a thousand copies of Elliot on Husbandry, and that he be requested to insert such notes as he may think proper, and omit any part of the work he may deem expedient.

The premium of two hundred and fifty dollars was awarded to Cornelius Coolidge, for the first ten ewes imported from Spain.

Sundry parcels of seeds were presented for distribution, by Daniel Parker, Esq., of Paris.

Three hundred dollars were contributed towards the encouragement and support of the Botanic Garden at Cambridge.

A letter was communicated from an anonymous source, concerning a more humane method of killing cattle.

Another volume was published this year by the Trustees, in which much of the space was devoted to the advantages of increasing and improving our flocks of sheep.

A. D., 1811.

Richard Sullivan, Esq., was chosen Recording Secretary, in the place of Rev. Dr. Kirkland, and John Prince, Esq., in the place of Rev. Mr. Buckminster, as Trustee.

A copy of a work entitled "Advice to Shepherds, on the Management and Care of Sheep," translated from the French of M. Daubenton, by a Gentleman of Boston, was presented by Mr. Belcher, the Publisher, and committed to Messrs Winthrop, Parsons, and Dexter, to examine it and report upon the expediency of recommending it to the public. The Committee subsequently gave it a full recommendation.*

* The translator of this work was the Hon. James Bowdoin, one of the first Board of Trustees, Minister to Spain, and son of the Governor, who imported many Merino Sheep, and kept large flocks at Nasahwn Island. The original work is an authority in France, at the present day.

The Recording Secretary was ordered to distribute this year's publication, as follows: To the Berkshire Agricultural Society, thirty copies; to the Western Society of Middlesex Husbandmen, thirty copies; to the Brookfield Association, twelve copies; to Benjamin Vaughan, twenty copies; and to each of the Trustees, for further distribution, twelve copies.

One hundred dollars was given to Professor Peck, to be expended in the purchase of trees and plants, for the Botanic Garden, at his direction.

The sum of two hundred dollars was also voted this year, towards the general support of the Botanic Garden; "it being the opinion of the Board that the support of that institution is important to the purposes of agriculture."

Communications on the subject of *Fiorin** grass, by John Winthrop, and from Elkanah Watson, and others, on various subjects connected with agriculture, were received, and duly considered.

This year the Trustees commenced a new series of their publications, and in the preface they say, "Should the stock of communications put it in their power to issue them hereafter quarterly, they shall execute the duty which will devolve on them, with great pleasure."

A. D., 1812.

Hon. John Adams, having declined serving again as President, Dr. Aaron Dexter was elected in his place. Samuel Pomeroy was elected first Vice-President; Thomas L. Winthrop second Vice-President, and John Prince Treasurer, and Josiah Quincy took his place in the Board of Trustees.

* Fiorin (agustis stolonifera) is only a variety of the white-top, or agustis alba, which gained great notoriety in England and Ireland—volumes having been written in its praise, while it received the execrations of those who found it troublesome to eradicate it, on account of its creeping and stoloniferous roots. C. L. Flint's Report for 1857, p. 28. For a full account, see Mr. Winthrop's Letter, Mass. Agricultural Journal, vol. 3, p. 32.

Justin Ely, of West Springfield, presented to the Society at the annual meeting a quantity of seed from the oat grass,* with a letter upon the subject.

A circular having been issued the year previous, recommending the formation of societies in the towns for the promotion of agriculture, the Secretary was ordered to furnish a copy of the publications of the Society to each Association that should be thus instituted.

The model of a double plough was ordered to be procured, the original being in the possession of Benjamin Vaughan.

M. Tessiers' work on Merino sheep was referred to the Publishing Committee,—a review of which was afterwards published. See vol. 3 of the Transactions.

Several extracts from English publications on the culture of carrots were read and referred to the Publishing Committee, and afterwards published by the Society.

Mr. Whitlow made known his discovery of a new species of *urtica*, which he recommended as a valuable substitute for flax; a full account appeared in the printed Transactions.

The Corresponding Secretary communicated a letter from Elkanah Watson and others, praying pecuniary assistance in aid of the Berkshire Agricultural Society. He was requested to return for answer to said letter, "That this Board does not conceive itself authorised by the charter of the Society, to favor, by grants of money, any one in particular of the several respectable agricultural societies within the Commonwealth; and that, therefore, however much it may wish for the prosperity of the Berkshire Society, it cannot make any appropriation out of the funds to the exclusive benefit of one section of the country. That this Board will cheerfully co-operate in any measures, which will promote the general interests of agriculture, at the same time that they favor the objects of the Berkshire Society, and will immediately take into consideration the expediency of offering premiums for the same improvements for which the Berkshire Society have offered premiums."

Subsequently two premiums were offered, at the suggestion of the Berkshire Society, of one hundred dollars each, for a

* See Mass. Agricultural Journal, for Nov. 1813, p. 38.

specimen of *madder* of good quality, the largest amount grown by any person in the Commonwealth, within three years, not less than one thousand pounds; and the same with regard to *woad*, not less than five hundred pounds grown within two years.

A communication from Mr. Lowell, the Corresponding Secretary, was read, "On the present low state of agriculture in this Commonwealth, and the general neglect of the means of improvement," and recommending that measures be adopted by the Board, to awaken, if possible, a livelier interest in this important subject. The letter was referred to a committee, which at a subsequent meeting made a report, and after some amendments, it was accepted; and it was also voted:

"That one thousand copies of the letter reported by the Committee, addressed to farmers, be printed; and that a copy be forwarded by the Recording Secretary to the town clerk in every town in the Commonwealth, with a request that he would cause the same to be read to the inhabitants when assembled in town meeting, and that he would, as soon as convenient, report to the Recording Secretary, any measures taken by them in conformity with the wishes of the Trustees.

"That the important queries suggested by the Corresponding Secretary, together with those heretofore printed by the Board, be printed, and a copy sent to each town, accompanying the letter addressed to farmers.

"That the clergy of the respective inland towns be admitted honorary members of the Society, and that the Corresponding Secretary be requested to address a letter to them, on the importance of attention on the part of the people to the means of improvement in husbandry, which are within their reach, and request the exertion of their influence in aid of the measures of the Board."*

A committee was appointed to confer with Dr. Gorham,† respecting the analysis of the various soils and manures, and consider the expediency of employing him for that purpose, and

* For the queries see the 3d vol. of the Mass. Agricultural Repository, p. 55.

† A scientific and distinguished physician and chemist of Boston.

also to collect and digest, for occasional publication, what has hitherto been printed on this subject.*

The library of the Society was this year removed to the Boston Athenæum, and placed under the charge of the librarian of that institution.

Much activity was manifested by the Trustees this year. Those members who had farms under their immediate care, were requested to communicate their experiments, and any interesting facts which come under their notice, with a view to publication. The Board subscribed for all the foreign and domestic journals of agriculture, and the information extracted from them was disseminated through the pages of the Agricultural Repository. Much of this was due to the active and energetic character of the Recording Secretary, Hon. John Lowell.

One hundred dollars was given for the purchase of trees and shrubs for the Botanic Garden, and fifty dollars for the purchase of roots and seeds, to be raised there, for sale and distribution.

A. D., 1813.

No change was made this year, in the Board of Officers and Trustees.

The Hon. Josiah Quincy read a communication giving a detailed account of his method of cultivating the "American Hedge Thorn," the progress of its growth since 1808, when first planted, and the expense attending it. It was referred to the Publishing Committee.†

Gorham Parsons presented a specimen of Derry Wheat, (so called) raised by him at Brighton, with a description of the same.

A letter from Mr. Moses P. Gray, giving an account of the making of sugar from the sap of the butternut tree, with a sample of the sugar, was read.

* The report made by him is in the 3d vol. of the Repository, p. 83.

† This hedge is still alive and vigorous in Quincy, at the residence of its public-spirited planter.

Various other subjects, such as the method of grafting trees by approach; on an improved method of propagating the white thorn by cuttings from the root; on the cultivation of wild oat grass, fiorin, and other grasses; on the cultivation of madder; on the rotation of crops; on refining cider; on the advantage of cutting the tops of carrots while growing; an account of a new churn; and on the merits of several machines for raising water, received the attention of the Trustees.

Six hundred dollars was loaned by the Society for the use of the Botanic Garden.

A Committee was appointed to apply to the legislature during its present session, for an allowance in addition to the present yearly grant, for defraying the expense of printing the Society's publications, and also for pecuniary aid to the Massachusetts Professorship of Natural History. An act was obtained to allow them their accounts that shall be well vouched, for any sums paid by them for printing and circulating their publications on agriculture only, for the raising of seeds and plants, or the expense of any experiments made by them with a view to promote agricultural knowledge, provided that the same shall not in any one year exceed one thousand dollars.

In consequence of this liberal appropriation by the State, the Corresponding Secretary prepared a report, making such a division between the printing and the public garden as in his opinion would best advance the cause of agriculture, allowing four hundred dollars to the former and six hundred dollars to the latter. Two principal objects were to be aimed at in the second appropriation, viz.: 1st, to introduce into cultivation as many native plants as possible; 2d, to devote an acre of land to raising seeds of culinary vegetables, and also "to have specimens of *fiorin* grass, oat grass, woad, and any other plants rare and curious."

A committee of five, consisting of Messrs. Lowell, Preble, Perkins, Prince, and Parsons, were appointed to take charge of the garden. It would have been difficult to find five other persons in the State equally competent for the task.

A considerable number of answers to the queries which had been circulated, were received during this and the previous year, which were digested and published by the Trustees.

The first number of the volume of transactions for this year, appeared under the new title of the "Massachusetts Agricultural Journal," with the following preface:

THE Trustees of the Massachusetts Society for promoting Agriculture, offer to the public the first number of a new series of their publications. Should the stock of communications put it in their power to issue them hereafter quarterly, they shall execute the duty which will devolve on them, with great pleasure.

The various topicks of Agriculture have already been treated by able writers, and frequent attempts made to rouse the spirit of careless and improvident cultivators, by eloquent appeals to their interest, patriotism, and philanthropy. But the kind of book from which the farmer will, without doubt, derive the greatest advantage and the instruction of which he stands most in need, is, that which makes known to him the practice and experience of the most active and intelligent men, inhabiting the same district of country with himself, and not dissimilarly circumstanced as respects climate, soil, and the general face of the country.

There are maxims in Agriculture of universal application, and *hints* derived from a foreign country sometimes lead to important improvements, but the attention is more deeply engaged, and the memory more strongly impressed by what passes in our own neighbourhood, besides, narratives of improvements in distant countries are commonly viewed with distrust, and disregarded often as mere innovations. It is far otherwise with what takes place in the society, town, or county, or State to which we belong; the accounts can either be verified by our own observation, or are admitted without question as true, from the known credibility of those from whom they are derived.

How far modes of culture practised in other countries are suitable to our own, is matter of inquiry for gentlemen of leisure and intelligence; their testimony will be heard with interest by the farmers at large, and their recommendations adopted with thankfulness and followed as the sure road to wealth.

From these remarks it will appear to be the object of the Trustees, in their future publications, as in their former, to open a channel of communication between the several Agricultural Societies in this Commonwealth, and between the individual farmers of the same county and of the same town, to promote as far as it may be in their power, a frequent and familiar interchange of practical hints—to carry the knowledge of new facts from one farm to another, and to record for the benefit of the present generation and that of our posterity, the course of husbandry of the good farmers of Massachusetts.

A work of this kind, lays no claim to literary distinction. It will be open to the communications of all farmers. Their inquiries will receive respectful attention; and any doubts or difficulties will be immediately considered and answered, or published for the consideration of the speculative.

The simple, plain, and familiar style used in common life, is found often to convey as precise ideas on subjects of business as the more refined language of the scholar. It is hoped, therefore, that our intelligent husbandmen, who have not leisure to attend to the arts of composition, will not be deterred by too great delicacy from communicating for publication, the results of their experience. They should reflect, that it will operate to induce others to do likewise. And the mutual encouragement afforded by example, will thus be the means of bringing together a mass of information, highly interesting and profitable to all. Great expectations are formed from the numerous town societies, instituted recently for the promotion of agriculture. The promptitude with which they have been organized, and the zeal they have manifested is highly flattering to the object. All such societies will be entitled, of course, to a copy of these publications, and to a number for distribution to individuals, as a reward of good husbandry. Correspondents will also be entitled to a copy of the number in which their communications shall appear.

In this volume a description of the madder plant is given, with the mode of its cultivation. There seems to be no reason why it could not be successfully cultivated in this State. Many hundred thousand dollars are annually paid by our manufacturers for it, which is all imported from Europe.

A. D., 1814.

The Board remained the same as last year.

Mr. Prince communicated to the Board a written statement of the increase of his flock of Merino Sheep, since the year 1810, and the average weight of fleeces each year, showing an increase of weight each year, with a discernible difference in quality.

A premium was awarded to Mr. Andrew Haliburton of Portsmouth, for a machine for cleansing butter from its whey, without working it by the hand.

The premium for the best machine for cutting straw, was adjudged to Elisha Hotchkiss, of Brattleboro, Vermont;* and that for the best herd of swine to Ely Cooley, of Deerfield.

Communications on the comparative productiveness and value

* The patent right was afterwards purchased by the Board, for the benefit of the State.

of different species of grass, and the importance of plaster of Paris as manure; of an experiment carefully made by Josiah Quincy, showing that the topping of carrots while growing, to be used as fodder, is injurious to the crop; on the result of an experiment, by Mr. Brooks, on the raising of wheat; from Thomas Hews, Esq., of Dorchester, showing from experiment the superior advantages of drill husbandry over broadcast; from Mr. Taft, of Uxbridge, and Capt. John Jenks, of Salem, giving an account of their wheat-crops; on wheat, barley and carrot crops of the past season, by Gorham Parsons, Esq.; from Asa Andrews, giving an account of a disease in the feet of cattle, not unlike the foot-rot in sheep, cured by cutting off the fore-ends of the hoof; also, various answers from the different town farming associations to the queries issued by the Board.

Several threshing machines were exhibited for the premium offered by the Board.

A Committee was appointed to invite the American Academy of Arts and Sciences, the Trustees of the Boston Athenæum, the Massachusetts Historical Society, and the Linnæan Society, to appoint Committees to confer upon the expediency of applying to the Legislature for authority to raise by lottery, the sum of Forty Thousand Dollars, for the purpose of purchasing a lot of land, and erecting a fire-proof building, suitable for the accommodation and preservation of their respective libraries, documents, &c.

One hundred dollars was appropriated to the purchase of native forest-trees, to be planted in the Botanic Garden.

One hundred pounds was devoted to the purchase, and importation of Agricultural Works.

The expediency of establishing a seed store, under the patronage of the Board, with a list of the seeds to be kept on hand, was referred to a Committee.

Five hundred and fifty dollars was contributed to the Professorship of Natural History.

A. D., 1815.

Samuel G. Perkins retired from the Board, and Edward A. Newton was elected to fill his place. Upon his declining to serve, a special meeting of the Society was called, and the Rev. John T. Kirkland was chosen to fill the vacancy.

It was voted that each member of the Society should pay an assessment of one dollar annually, or on payment of five dollars, he should be considered a member for life, and be exempted from future assessments.

Messrs. Lowell and Parsons were appointed a committee to report a plan for a general cattle show, should they deem it expedient to patronise one. They subsequently reported in favor of an annual exhibition of this kind, under the patronage of the Board in the month of October.

Models of several new agricultural implements, or improvements upon old ones, were subjects of trial this year, of which the only one that seems to have met the entire approval of the Board, was the straw-cutter of Mr. Hotchkiss. The patent of this was purchased, and a person was employed to manufacture and distribute them among the agricultural societies of the State. Among other inventions was a machine, by the aid of which, a current where there was no head of water might be used as a water-power, and applied to the working of machinery. Upon trial, however, it did not equal the expectations entertained of it. The sum of five hundred and fifty dollars was paid to Professor Peck, for the use of the Botanic Garden.

A letter was read from Obed Mitchell, of Nantucket, stating that in consequence of the severity of the last winter, (1814–15) and the scarcity of fodder, one-half of the sheep of the island had perished.

John Kenrick, Esq., of Newton proposed for consideration, a new and cheap method of destroying the canker-worm in a chrysalis state.

A. D., 1816.

E. Hersey Derby of Salem, was elected in place of Dr. Kirkland as Trustee. This was the only change in the Board.

The subject of holding an annual cattle show had been considered by the Trustees, from time to time, for several years, and it was finally acted upon by the adoption of the necessary rules and regulations, fixing upon Brighton as the place where they should be held.

The following printed announcement appeared in the number of the Journal for June.

ANNUAL CATTLE SHOW,

AT BRIGHTON IN THE COUNTY OF MIDDLESEX.

The Trustees of the Massachusetts Society for Promoting Agriculture, taking into consideration the importance of improving the breed of domestic animals, and influenced by the example of enlightened societies in all parts of Europe, who have established annual exhibitions of such animals, and encouraged the cultivators to produce them by suitable rewards, and wishing as far as possible to fulfil the expectations of the Legislature of this Commonwealth, who have liberally patronized this institution, have determined to establish an *Annual Show of Cattle* in a situation, and at a season of the year, the most convenient for the citizens at large.

They have therefore adopted the following regulations, of which the Farmers throughout this State will please to take notice; and in order to save trouble to the Trustees and themselves, they will conform thereto, whenever they may see fit to become competitors for the prizes.

I. The annual show of cattle patronized by this society shall take place at Brighton, on the second Tuesday in October in every year, the first to be exhibited on the second Tuesday of October, 1816.

II. In order to assure to the competitors the most perfect fairness in the distribution of the Premiums, the Trustees will nominate three judges from among their own members, and two other gentlemen well skilled in such subjects, to be joined with them; the decision of a major part of whom shall be final, and the premiums shall be paid accordingly.

III. The Premium shall be divided into two classes, with respect to each description of animals, in order to encourage those who, having failed to attain the first premium, may yet be entitled to some reward for their exertions.

IV. The object or animals for which premiums shall be awarded, and the rates of such premiums shall be as follows, viz:

1. To the person who shall produce the finest Ox fitted for slaughter, of not less than thirteen hundred pounds weight, *forty*

dollars, or a *silver cup* of equal value, at his option, which cup shall be ornamented with a suitable inscription.

2. To the person who shall produce the next best Ox fitted for slaughter, *twenty dollars*, or a *silver cup* of like value.

3. To the person who shall produce the best pair of working Oxen, *forty dollars*, or a *silver cup* of equal value.

4. To the person who shall produce the next best pair of working Oxen, *twenty dollars*, or a *cup* of equal value.

5. To the person who shall produce the best Bull, having regard to his size, form, and other qualities, *thirty dollars* or a *silver cup* of equal value.

6. To the person who shall produce the next best Bull, having regard as aforesaid, *twenty dollars*, or a *silver cup* of equal value.

7. To the person who shall produce the best Milch Cow, with the requisite proofs of her goodness as to quantity and quality of milk, *twenty dollars*, or a *silver cup* of equal value.

8. To the person who shall produce the next best Milch Cow, *fifteen dollars*, or a *silver cup* of equal value.

9. To the person who shall produce the best Merino Sheep, not less than five in number, whether rams or ewes, having regard to their forms and fleeces, *forty dollars*, or a *silver cup* of equal value.

10. To the person who shall produce the next best Merino Sheep, being at least five, *twenty dollars*, or a *silver cup* of equal value.

11. To the person who shall produce the best native Sheep, whether rams or ewes, being at least five, having regard to their size, form, quantity and quality of fleece, *ten dollars*, or a *silver cup* of equal value.

12. To the person who shall produce the best Swine, not less than *two* in number, and not less than one year old, *ten dollars*, or a *silver cup* of equal value.

13. To the person who shall produce the next best Swine, not less than *two* in number, and not less than one year old, *five dollars*, or a *silver cup* of equal value.

V. The said premiums shall be adjudged on the day of meeting, and shall be paid within ten days after the meeting, or sooner if convenient, and if the party shall elect to receive money.

In case any of the Trustees shall be competitors, one of the Trustees being a member of the Board shall be replaced by a person not a member of the Board, so that in such case the judges not being members of the Board shall constitute a majority.

The Farmers, it is hoped will view this attempt to improve the breed of our domestic animals with favor, and as an additional and much stronger inducement to enter into the competition; they will of course reflect, that this *Cattle Show* will draw together a great collection of persons, and thus will much facilitate the sale of their cattle, and also that the animals which shall command the prizes, will sell at very much enhanced prices, either for Boston market, or to Connoisseurs who may be desirous of improving their own breed.

AARON DEXTER, *President.*

The account of the Show is thus given in the Records:

"The Board of Trustees met at Brighton, on Tuesday, the 8th day of October, 1816, to attend the first cattle show established agreeably to a vote at a former meeting. All the Board attended. The Board having assembled at the Town Hall, and a great concourse of people attending to witness the proceedings, the meeting was adjourned to the meeting-house in Brighton.

"The President, (Dr. Dexter,) having called the attention of the assembly to the objects of the meeting, the Corresponding Secretary, (Mr. Lowell,) stated the advantages expected to accrue to the country from the institution of a cattle show, and read the regulations adopted and previously published in the newspapers and Society's Journal.

"The President then delivered an appropriate address, which having finished, he gave notice that the judges appointed agreeably to the regulations, would forthwith proceed to view the animals entered for the prizes. After the inspection and a trial of the working cattle, the Board, attended by a numerous company of distinguished and respectable citizens, partook of a dinner provided at Hastings's Tavern. Toward evening the public were re-assembled at the meeting house to hear the premiums as adjudged by the Committee."

Among the successful competitors was Mr. Caleb Oakes, who received the first premium of $20 for the best milch cow. This was the celebrated Oakes cow. Fisher painted a portrait of her, by order of the Trustees, from which an engraving was afterwards taken. The original picture has been unfortunately lost. It was placed in the hands of the President of the Board, to be transmitted to his successor. A *lapsus* in the transmission took place, but at what point of time is not known to the Board.

Another important movement was made this year, which has been continued to the present day. This was an order sent out to Messrs. Welles & Williams, to procure from France two bulls of the Alderney breed, and two Alderney cows.

John James, 3d's, invention of a machine for winnowing grain, was approved and recommended, and the Secretary was authorized also to give a certificate to any one, authorising the the making and vending of Hotchkiss' Straw Cutter within the

State. Several threshing machines were exhibited by models constructed at the expense of the Society. A large number of seeds was presented to the Society, from different quarters of the world, and distributed.

The annual assessment of one dollar was abolished. Members hereafter admitted, were required to pay five dollars, entitling them to all the privileges of a member for life. Those of the present members who preferred to pay the annual assessment, instead of one payment of five dollars were allowed to do so.

A. D., 1817.

Mr. Preble retired from the Board, and Mr. Nathaniel Ingersoll was chosen to fill his place. He declined serving, and at a special meeting, the Hon. John Welles, of Boston, was chosen.

Efforts were still continued to discover, or to procure the invention of, a good threshing machine. A letter was directed to Ex-President Jefferson, to obtain a description of one used by him, and to learn his opinion of it; also, to Rev. Mr. Elliot of Boscawen, respecting one invented by him.

The Second Annual Cattle Show took place at Brighton, on the 14th and 15th of October.

The premiums offered this year, embraced a much wider range of objects than the year preceding. Ploughing matches were instituted; articles of domestic manufacture, improved implements of husbandry, and agricultural experiments being upon the list.

The first premium for the best milch cow was not awarded, "the best cow on the field not having been entered seasonably, according to the rules and regulations, and it was thought improper to give the first premium for any cow, while a better one was on the field."

Mr. Fisher was employed to paint Col. Chapin's oxen, and the large heifer exhibited at the cattle show.

A Committee was appointed to consider the expediency of

erecting a building at Brighton, for the accommodation of the articles of domestic manufacture and improved implements of husbandry, at the cattle show.

The thanks of the Board were presented to the Hon. Israel Thorndike, for the promptitude with which he undertook to forward the views of the Society, as to the importation of foreign cattle, and for the liberality and activity which he displayed in the pursuit of the same.

The Trustees in their report of this year, in speaking of their doings, say that they "wait with impatience the arrival of the cattle from Normandy, to which their attention was originally directed, and regret that the limited state of their funds, would not permit them to extend their premiums beyond a given number of animals."

Two medals, or cups, of the value of thirty dollars each, were voted, one to Capt. Charles Tracy of the ship Galen, in testimony of the sense which the Trustees entertained of his public patriotism, in taking care of and preserving a fine cow and calf, introduced into this State, in the ship under his command; the other to Capt. Samuel Nichols of the ship Liverpool Packet, for taking care of and preserving a fine cow, introduced in his ship, for the purpose of improving the breed in this State, and an inscription to that effect was ordered to be engraved thereon.

Mr. Quincy was requested to revise the Queries on Agricultural subjects, formerly published by the Society, and Mr. Derby was appointed a committee to publish the revised list, bound up in the Farmer's Almanac with blank leaves, and to cause a suitable number to be circulated among the farmers of Essex, with a request that they would enter answers to said queries, and return them to the Board of Trustees.

This was done accordingly, and from an examination of some of those still remaining, it is evident that much valuable information may be obtained by this method, on the practice of husbandry.

A Committee was appointed to procure from England, at the expense of the Society, such new and approved agricultural machines, as they may think would be useful.

Daniel Waldo, Esq., of Worcester, presented one hundred

dollars to the Society, to aid in the erection of a suitable building at Brighton, or other purpose, at the discretion of the Trustees.

It was voted to recommend to the Society, at its annual meeting, to choose an Assistant Recording Secretary.

Four hundred and fifty dollars in money, was paid to Professor Peck, for the use of the Botanic Garden, besides sundry bills for trees, &c.

A. D., 1818.

There was no change in the Board this year. Benjamin Guild was elected Assistant Recording Secretary.

Seeds from France were presented by Mr. Welles; samples of various kinds of wheat, by Mr. Parsons; turnips from seeds presented by Ex-President Adams, and two or three different kinds of corn; also, a very large ear of corn, exhibited by Mr. Pomeroy, planted the 7th of May and the whole crop harvested on the 22nd day of August.

The Annual Show was fully attended this year, and occupied two days, the address being delivered by Mr. Lowell.

Various agricultural implements were imported from England, to serve as models for manufacturers of them in this country.

The Bull "Fill Pail" was placed in the hands of a Committee, with authority to give him, if they should see fit, to any farmer who would agree to keep him for two years, within twenty miles of Boston. The Bull was imported by Hon. Israel Thorndike, and placed at the disposal of the Trustees. He was finally sold to Mr. Breed, for one hundred dollars, on the condition that he should be kept in the State one year.

A piece of land in Brighton, having been generously given to the Society, for the purpose of erecting thereon an Agricultural Hall, by Mr. Abiel Windship, the Trustees voted to proceed to the erection of the building, and a Committee was appointed to solicit subscriptions for that purpose, and a sufficient amount was obtained without much difficulty among the Trustees and their friends.

Preface to the Journal for this year.

Some apology may be thought necessary for occupying so large a part of the present Number with the reports and documents, which relate to the late cattle show at Brighton. When, however, the reasons which induced the Trustees to give so detailed an account shall have been stated, they hope they will be deemed a sufficient justification.

If the useful and ornamental arts are susceptible of encouragement and improvement by publick rewards and exhibitions, or if any advantage can be supposed to be derived from such competition, it can scarcely be questioned, that these beneficial effects will be promoted by giving an extensive circulation to the history of such competitions. There has been scarcely an age or nation, in which the effect of publick exhibitions and rewards has not been tried. Among the ancient nations, they were instituted to encourage skill in horsemanship, in the management of ships, and in athletic exercises, chiefly with a view to fit and improve the combatants for war. In more modern times, they have been employed for the encouragement of the art of painting, or for the purpose of improving the breed of horses. It is only within a few years, we believe, that in Europe or America, this important principle of competition has been applied to the advancement of the most important of all arts, Agriculture.

It must be unnecessary to adduce any arguments to shew, that such exhibitions tend to the encouragement of this art. The continuance and extension of them, from year to year, in almost every part of Europe; the rapid improvement in the animals and productions offered for exhibition; the ardor with which they are attended, and the deep interest exhibited by the competitors, as well as spectators, preclude the possibility of doubt.

Such exhibitions serve to bring the agricultural art into greater credit, and to advance its professors to the high standing which they deserve. They make known more completely the powers and capabilities of a country; they draw from obscurity the modest, but ingenious and intelligent cultivator; and by making apparent the superiority of his productions, lead to a knowledge of the art and skill by which he was enabled to bring them to perfection. Who, for example, would have supposed, that Massachusetts could furnish an animal like the Oakes cow, capable of producing nearly 500 pounds of butter in a season? And how important to learn, that a very considerable portion of this product was owing to a liberal manner of feeding, which would astonish and alarm most farmers, and yet which was amply repaid by the increased productions?

There are other reasons for such a publication of the result of the late exhibition. It is in this country, as yet, but an experiment. To the munificence of the government of this Commonwealth, are the Trustees, in a considerable part indebted for their ability to offer such a number of rewards, and to so liberal an amount. A very small portion only of the people can be witnesses of the exhibition. The Trustees, therefore, as agents for the publick, and in some degree entrusted with the application of the publick money, owe

to the whole community a full and satisfactory account of the effects of these rewards. The Trustees have, it is true, published a succinct history of the claims and decisions, but there are material defects in this mode of proceeding, and it was adopted only to satisfy the momentary curiosity of the publick. Some persons might retain a degree of incredulity as to some particulars, such as the amount of agricultural productions for which premiums had been granted, or the times in which the several competitors in the ploughing match performed their labour. As an example of this skepticism, it may be remarked, that some of our neighbors were very pleasant upon the speed of our oxen. The Trustees have no disposition to spoil a little pleasantry, but they would wish to prove to the world, that they are not in the practice of publishing extravagant accounts. They have, therefore, resolved to print the separate reports, on every branch of competition, with all the documents and vouchers which accompanied them.

They form a body of evidence, which would be sufficient to establish facts of much greater importance, and points of much more incredible character. To the report of our ploughing match, at Brighton, they have subjoined an account of the best trial of the same nature, which they could find in the Bath and West of England Society's papers; and to the official return of the weight of our prize oxen, they have added the weight of the largest ox ever slain in England, and whose size is on record.

It may be of use, and produce confidence in the decisions of the Trustees, to state, that in every branch in which any one of the Trustees was a competitor, there were two judges of great skill and irreproachable character chosen out of the board, and not one Trustee was permitted to sit even as a member, much less to give a vote on any Committee appointed to decide on any class of articles, in which such Trustee was a competitor. In addition to which it may be remarked, that there were as many claims of Trustees rejected, as there were of other persons, in proportion to their respective numbers. A transaction, which merits the thanks of the community, has in some instances been either misunderstood or misrepresented. An idea has prevailed in some places, that the Trustees had purchased the cattle to which the first premiums were awarded. The fact is not so. The Springfield oxen had been celebrated for a year past. They were supposed to be the finest ever produced. There was a strong desire on the part of many persons, that Massachusetts might have the credit she deserves as a grazing country. Col. Chapin was not willing to drive his cattle to Brighton, at his own risk.

Some generous publick-spirited gentlemen, out of the board, and a few within it, subscribed a sum to purchase the cattle in order that they might be exhibited at Brighton, and at a certain, inevitable, expected loss. They paid 1050 dollars for the oxen. Col. Chapin drove them down, and, as was agreed, took the premium himself in part payment for them. They were not exhibited, as they might have been, for profit as a show. There has been, as was expected, a loss, but the remuneration consists in having shewn to thousands of spectators, the finest animals *probably* at *that moment* in the world, the products of the rich pastures of Massachusetts.

To conclude, this account ought to be continued annually in the present form, as it serves as a foundation for a complete history of our agriculture. How valuable would be such a document respecting the agriculture of Rome, under the republick, and the emperors, and of Great Britain, even if it were but one in each century. We rejoice to see similar societies springing up in every part of our country. Publications emanating from them will make us better acquainted with the progress of civilization, and the comparative wealth and advancement of the different sections of the United States, than we can in any other way become.

A. D., 1819.

The Board continued the same as last year.

Mr. Lowell was appointed a committee to confer with the Treasurer of the Visitors of the Botanic Garden, on the claim of the Society against Abiel Wood, on a contract for the sale of a township of land to him.

Samples of wheat and millet from Russia, the seed raised by Capt. Seth Spring, of Saco, were presented.

At the Annual Cattle Show this year, there was a full attendance, and the exhibition generally was superior to either of the preceding ones, and showed an evident progress, and improvement. The Trustees, in their Report say, "If any thing further could be necessary to satisfy the public of this fact, we might add that the finest specimens of young animals were in almost every case, the progeny of those to whom the Society and public suffrage had awarded the premiums on former years."

"Thus, to instance a few examples,—the progeny of the excellent bull Fill Pail, though raised in various parts of the country, were in every case distinguished by their resemblance to the sire, and they afford a reasonable hope, of which time only can decide, that they will prove an important acquisition, and work rapid improvement in our stock of cattle destined for the dairy."

"The same remark may be made, with still greater force, as to the progeny of Mr. Williams' extraordinary imported Teeswater Bull."

Among the premiums given, was one of thirty dollars for an imported cow, of the Alderney breed.

Forty-four bushels of wheat were proved to have been raised upon an acre of land, by Mr. Richardson.

It was voted that the stated meetings of the Trustees, for the future, shall be invariably on the second Saturday of each month, and that it shall be the duty of the Recording Secretary to notify the gentleman whose turn it may be, one week before issuing notifications for the meetings, which notifications shall be at least one week previous to the meeting, and if the gentleman whose turn it is, finds it inconvenient to have the meeting at his house, he shall find some other Trustee to exchange with him.

A great variety of seeds was received and distributed this year; and several improved ploughs and other agricultural implements were introduced by the Society to public notice.

Two numbers of the Journal were printed during the year, the second of which contains an able article on "the Agriculture of Massachusetts," by Mr. Lowell, which will appear in the Appendix, or in a succeeding volume.

A. D., 1820.

There was no change of Officers this year.

Mr. Parsons, Chairman of the Committee to attend the Cattle Shows of the Worcester and Middlesex Societies, reported, the pleasure experienced in performing that duty, and the great gratification afforded by the attentions received, and by the exhibitions of animals and manufactures, witnessed by the Committee.

Mr. Quincy was appointed to superintend the Society's publications.

Hon. John Coffin, of St. John, N. B., presented to the Society a fine stallion, five years old, of the light cart breed, (Suffolk Punch) bred in England. This horse was named Columbus,

and was "placed out" for the use of the public, at the charge of the Society.

General Coffin afterwards received the Society's gold medal, and was chosen an honorary member of the Society for life. The Trustees, at the same time, "express their high gratification in the evidence, which the two last years have afforded, that in the exertion to promote the cause of agriculture, there has been a generous emulation and mutual co-operation between the Societies for the promotion of agriculture in the United States and those of the British Provinces in America."

A premium was offered in co-operation with the Proprietors of the new market in Boston, for the best butter brought to that market.

The long pending difficulty with Mr. Wood, in the contract for the sale of the township of land granted, but not located, by the Legislature, was settled by a cancelling of the bargain.

The cattle show at Brighton, was a successful exhibition. The address was delivered by the Recording Secretary, Richard Sullivan, Esq., and was replete with sound, practical information.

The Chairman of the Committee on *Domestic Animals*, of every description for which premiums were offered, Hon. John Lowell, made a full and interesting report, from which we extract the following:—

"The effect of this show on the character and qualities of our domestic animals, was so marked and so unquestionable, that a man who had viewed the exhibition in its infancy, four years since, could scarcely believe that he was in the same Society, and surrounded by the same cultivators, who assembled and brought their best productions at that period. The race of hogs was so entirely changed and improved, that we could with difficulty recognize a feature of the tall, raw-boned, thick-legged race, which had for so many years been the disgrace, while they had consumed the profits, of the farmer of Massachusetts. The same remark applied, with still greater force, to the exhibition of fat cattle." * * * * * * * * *

"It is a great pleasure to us to announce that our premiums and encouragement have induced Mr. Williams, of Northborough, to introduce a pure Teeswater Bull, Mr. Parsons (one

of the Trustees) a Holderness, and Mr. Coolidge his admirable bull Cœlebs, of the same race." * * * * * "We ought not to omit the introduction of the Flanders breed (Fill Pail) by Col. Thorndike, a stock which, if we can judge, either from its reputation in Europe, or the present promise of its progeny here, may prove little, if any inferior, for the dairy, to the best races of England." * * * * * * "The greatest benefits we have ever hoped to derive from these exhibitions and the offer of premiums, were that we should select and save from indiscriminate slaughter, *the finest of our own stock*, while we should gradually improve it by crosses with the best animals of foreign countries. There can be no stronger proof of the benefits we have derived, than the fact that the progeny of the foreign races are, by the public as well as the Committee, preferred to those of our native stock."

The show of implements was very much increased this year, many of them being new inventions: among these was a hominy mill, which cracked a peck of yellow corn in four minutes, and was, judging from the description, not unlike the "*Little Giant*" mill of the present day. A corn-sheller, on a new principle, was exhibited; also a straw-cutter, a plough for paring meadows, a double forcing pump, and a flax-seed separator.

A pistol was likewise exhibited, containing seven barrels, so constructed as to discharge seven balls successively with once loading and priming; upon which the Committee remark, with some jocularity, that "they do not deem themselves authorized, notwithstanding the ingenuity displayed in its construction, to recommend any premium, it not being an instrument of use in agriculture; and having no certificate of its having been used and improved by a practical farmer."

Any further notice of sums given and services rendered to the Professorship of Natural History, is omitted, simply closing with the remark, that until the final relinquishment of the visitorship, it continued to receive the care and attention necessary to its full development and usefulness.

A. D., 1821.

The Board continued the same as last year.

The Treasurer was authorized to procure two pairs of the breed of Leicester sheep.

A letter was received from N. Biddle, Esq., of Philadelphia, describing a mowing machine.*

The address at the cattle show, in October, was delivered by the Rev. Mr. Colman, a great portion of whose life was devoted to the cause of agriculture. The premiums offered amounted in the aggregate to two thousand dollars. The number of entries for premiums on horned cattle had increased from thirty-seven, in 1817, to more than one hundred, the number of animals exhibited exceeding three hundred, notwithstanding three "very respectable county societies had sprung up full grown in our immediate vicinity."

The Supplementary Report of the Committee on Agricultural Experiments is worthy of attention.

The Committee on Agricultural Experiments, submit for the consideration of the Board, the following, in addition to their Report dated the 11th day of October last, to wit:—

That Payson Williams, Esq., of Fitchburg, in the County of Worcester, is entitled to the Society's premium of twenty dollars, for having raised the greatest quantity of Potatoes, being five hundred and fifty-one and a half bushels, on one acre of land. Mr. Williams has been a successful competitor for some of the premiums offered by the Trustees, three years in succession, which must be attributed to his skill in husbandry, and to the excellent management of his agricultural concerns. In his communication to the Committee, he states, that "he planted 24 bushels of potatoes, 3 of which were the Irish Apple, so called, imported from Liverpool, last winter, 3 the Fitchburg Whites, and the remainder the Rio de La Plata Reds. The relative yield between the European, American, and South American, resulted in favour of the reds of La Plata; yet in quality, for the table especially, the Irish are far superior to either, and ripen four weeks earlier than the other kinds." The entire expense of culti-

* The attempt to mow and reap by a machine, impelled by horse power, is not of modern date. The first of which we have any record of its being practically used, was the invention of a play-actor, who took his leave of the stage, at Manchester, in the year 1811, in the play of "Speed the Plough," in which the machine was operated on the stage. There was also a patent granted by the Colonial Legislature of Massachusetts, for a mowing machine.

vating this acre of land in potatoes, including the value of the manure, was eighty-four dollars and ninety-eight cents. Mr. Williams also claims the premium of thirty dollars, for having raised the greatest quantity of Spring Wheat, on one acre. The Committee, however, did not consider him to be entitled to said premium, the quantity raised not exceeding a medium crop for Massachusetts. In his letter to the Committee, he says, "The extreme drought of the season will account for a crop of no more than twenty bushels and twelve quarts of wheat from the acre."

That Messrs. Tristram and Henry Little, of Newbury, in the County of Essex, are entitled to the Society's premium of thirty dollars, for having raised the greatest quantity of Indian Corn, being one hundred and five bushels and six quarts of sound corn, on one acre. In their statement they say, "The seed was the eight-rowed yellow corn, selected in the field, the preceding crop, from the most fruitful, thrifty stalks—four or five kernels put into each hill—the hills were four feet by three feet apart: it was hoed three times, and the vacant hills filled up the first and second hoeing by transplanting from those that had four or five stalks, calculating to have three stalks in each hill."—The entire expense of cultivating the acre, including the cost of the manure, was thirty-nine dollars. Messrs. T. & H. Little are also entitled to the premium of twenty dollars, for having raised the greatest quantity of common English Turnips, on one acre, being seven hundred and fifty one bushels, "completely trimmed, fit for the market—about two hundred bushels have been sold, some of them were sold by the ton, and have been weighed, and we find that they weigh fifty-four pounds to the bushel. The land was ploughed with a horse, and a double mould board plough, in ridges three feet apart—one row was sowed on each ridge, with a machine, which took one pound of seed, and a hand roller was made to pass over each ridge, which completed the sowing, which was on the fourth of July. When they were out of the way of the fly, they were thinned, to the distance of one foot apart, on the ridges; they were twice ploughed and hoed: about the last of October they were harvested." The entire expense of cultivating the acre, including sixteen dollars, the cost of nine cords of manure, was thirty-two dollars and thirty-three cents.

That John Prince, Esq., of Roxbury, in the County of Norfolk, is entitled to the Society's premium of twenty dollars, for having raised the greatest quantity of Mangel Wurtzel, being six hundred and forty-four bushels, on one acre. Mr. Prince says, "The soil is a rich light loam, on a hard, gravelly bottom, on a hill descending to the South, having sixty apple trees in the above space, averaging fifteen feet high, which obliged me to have the rows directly up and down hill. The heavy rains washed, and very much injured the crop;—could they have been across, I doubt not one third more at least of roots would have been gained. The entire expense of cultivating the acre, including forty-six dollars for twenty-three loads of compost manure, was sixty-nine dollars and seventy-five cents, being $10\frac{3}{4}$ cents per bushel, of fifty-six pounds weight; from which must be deduced a large quantity of thinnings during the season, and also of leaves at

the time of harvesting. Having succeeded perfectly in preserving my roots in the ground last winter, as published in the Repository, No. 3, volume 6, I have this year deposited, in precisely the same manner, most of the above crop, and also about four hundred and fifty bushels of Ruta Baga."

That E. Hersey Derby, Esq., of Salem, in the County of Essex, is entitled to the Society's premium of twenty dollars, for having raised the greatest quantity of Cabbages, being forty-three tons, nineteen hundred and ten pounds, weight, on an acre.

Mr. Derby is also entitled to the premium of thirty dollars, for having raised the greatest quantity of Vegetables, (grain, peas and beans excepted) for winter consumption of the stock on his own farm. It will be seen by the certificates produced by Mr. Derby, and which accompany this report, that he raised the last season on his farm, 749 bushels of Mangel Wurtzel, 530 bushels of Carrots, 526 bushels of Swedish Turnips, 1288 bushels of Potatoes, 126 bushels of Russian Radishes, 757 bushels of Common English Turnips, 43 tons and 19 hundred weight of Cabbages, and 15 ox cart loads of Pumpkins.

That Mr. David Little, of Newbury, in the County of Essex, is entitled to the Society's premium of twenty dollars, for having raised the greatest quantity of Ruta Baga, being six hundred and eighty-eight bushels, on one acre. "The seed was sowed on the 12th and 13th of June, one on each ridge, which took 3-4ths a pound of seed, and covered with a light harrow, drawn by a horse, lengthways of the rows. The entire expense of cultivating the acre, including the cost of four cords of manure, was twenty-three dollars seventy-nine cents." Mr. Little also raised five hundred and thirty bnshels of common Beets on one acre.

That Mr. William Mears, of Marblehead, is entitled to the Society's premium of twenty dollars, for having raised the greatest quantity of white Beans, being thirty-two bushels and four quarts, on one acre.

Claims for premiums were also exhibited to your committee by Thomas Shepherd, Esq., for having raised eighty-seven bushels and three-fourths of a bushel of Indian corn, on one acre. Col. Samuel Wright of Westford, in the County of Middlesex, for having raised seventy-eight bushels and five quarts of Indian corn, on one acre. Mr. John Dwinell, of Salem, for having raised five hundred and twenty bushels of carrots on one acre; and on the like quantity of land, five hundred and eighteen and a half bushels of potatoes. And John Prince, Esq., for having raised the greatest quantity of vegetables, (grain, peas and beans excepted,) for winter consumption of the stock on his own farm.

For raising the greatest quantity of parsnips, common beets, onions, and dry peas, for proving by actual experiment, the best season, and modes of laying down lands to grass, whether Spring, Summer, or Fall seeding, be preferable, and with or without grain, on different soils; for soiling cattle; for turning in green crops as a manure; for the greatest quantity of good honey, and superior skill in the management of bees; for the best mode of rearing, feeding, and fattening neat cattle; for the best superfine flour, manufactured in the State of

Massachusetts, from wheat raised in this State, no claim for premiums were made; these several objects are of great importance to the Agriculturists of the commonwealth, and deserve, and the Committee hope will have their attention, in the coming year.

By order of the Committee,

THOMAS L. WINTHROP, *Chairman.*

Boston, Dec. 22nd, 1821.

A. D., 1822.

There was no change in the Officers of the Board this year.

The address at the annual cattle show, at Brighton, was delivered by Col. Timothy Pickering, an earnest and practical agriculturalist. His subject was "the chemical process of compounding manures, with the application of these principles to common farming." Col. Pickering's address is said to have been too practical to suit the ladies, who had come in great numbers to hear him. It savored less of the flowers, than of the compost from which they sprung. There was a large general attendance on this occasion, and the number of animals exhibited, as well as their superiority, showed a marked improvement in this department of agriculture.

A fire in Wells & Lilly's bookstore destroyed a great part of the impressions of the volume containing the account of the show of this year.

A ram was presented to the Society, by Hon. D. L. Pickman, of Salem, who received it as the long-wooled sheep of Arabia.

An Essay on the Natural History of the Salt-marsh Caterpillar, by Dr. Harris, of Milton, was submitted to the Board, who voted that the Society's gold medal, of the value of thirty dollars, be presented to Dr. Harris, and that the essay be submitted to the Publishing Committee, to make an abstract of it for publication.

Not the least valuable portion of the published transactions of the Society is to be found among the Reports of the Committees on the subjects for premiums at the cattle shows. The following extract from the report on horned cattle will be read with

interest, as showing the views entertained more than thirty years ago, in relation to native stock.

This Committee having under their cognizance the articles for which the show at Brighton was *originally principally* designed, may be indulged in making some general remarks on the tendency and effect of their exhibitions.

It is not more than forty years, since the idea was entertained in Great Britain, that a spirit and energy could be given to agricultural efforts, by associations, public exhibitions, and premiums judiciously awarded. The effects produced in that country, more especially in the improvement of their stock, have far exceeded the most sanguine hopes of the first promoters of this system. We have little and indeed no doubt, that the horned cattle and sheep of Great Britain were fifty years since, not superior to ours. We believe that the races of domestic animals imported from any part of Europe, not only do not deteriorate, but that they improve in all the northern parts of the United States. We believe that we have native animals of all descriptions, with the exception perhaps of the crosses of hogs with the Chinese breed, (which we have however recently imported,) equal to any Great Britain possessed forty years since, when Bakewell, Coke, Princeps, and a hundred other farmers, or opulent landholders in that kingdom, set about the patriotic work of improving their native breeds. They did not commence it by *importations*—they confined themselves simply to *selection*, and the effects were such as that in a few years, bulls, which of the best description at a former period might have brought one hundred dollars, sold for four thousand five hundred dollars. This was no speculation of a visionary character, like the rage which prevailed with us for a short time in relation to Merino Sheep. It sustained itself, and exists to the present hour, so that a bull calf of certain breeds considered perfect, will bring from two hundred to four hundred dollars.

If we were asked the general character of our best shows of cattle compared to those at Smithfield on their anniversary show, or at Lewes, or many other places in England, we should say that it will require at least ten, or perhaps twenty years, for us to equal them. Yet it is our firm conviction, that if we had never imported a single foreign animal, but had excited a strong zeal in our own country to select and propagate the best animals of native production, we should in the course of twenty or thirty years have been able to send animals to Great Britain and contend against their best raisers of stock for the first prizes. Nay more, we believe *now*, that if we could transport the *best working* Cattle of Worcester and Norfolk, (the latter however being all purchased from back counties) to Great Britain, they might challenge *all the three kingdoms* to compete with them in all the various points of labour to which cattle are applicable. These working cattle are, *we know*, as much superior to theirs, as our stock is inferior to theirs in the articles of bulls cows, sheep and hogs. The fact, that we are so superior to them in this point, of which we have no question, proves, that we have among us an admirable but neglect-

ed race of animals, and the reason is obvious. Is a *calf* remarkably *fat?* Does he weigh one hundred and fifty pounds at the end of six weeks, and that accompanied by an excellent form and proportions? His fate is decided. He must feel the sharp knife of the butcher—he must prematurely pay the forfeit of his uncommon and excellent qualities, and load the table of our *epicures*, who would have made a better dinner on a smaller and less valuable animal.

It may be reasonably asked then, why have you encouraged the importation of *foreign stock?* Why have you paid such liberal prices to those who have imported them? Our answer is very brief—and we hope satisfactory. It was done *principally* with a view of shewing our farmers, what *had* been done in *other* countries in a short time by careful selection and cultivation. No man who ever saw Denton, Mr. Williams's bull—Fill Pail, Mr. Thorndike's, presented by him to the Agricultural Society—Cœlebs, sent to our country by Mr. Coolidge—or Holderness, imported by Mr. Parsons, could entertain a doubt, that they were superior to any animals of the same description which we had ever seen. It was a short and conclusive mode of producing conviction;—though equal care might in a few years have produced an equally improved native stock, yet the process would have been slow, and every lost year is of great importance.

That these animals did produce a great impression upon our farmers, it is now needless to state. The simple fact, that farmers, always too cautious of adventuring their money, were ready to send their cows at five dollars, and even ten dollars, to these imported animals, instead of fifty cents for the use of our native bulls, is conclusive.

But what is still more conclusive, because the facts we have now mentioned *might* have been the effect of fashion, or of speculation, is, that when the *progeny* of these animals appeared at our shows, they attracted every eye, and commanded on an average *four times* the price of our native breed.

The effect has been so great as to cause the disappearance of our native breed of *young* animals at our shows, with a few exceptions.

It ought however to be remarked that our cows offered for premium, are still almost entirely of domestic growth, and of most estimable qualities; so that we seem to possess all the advantages we could desire of availing ourselves of the perfection of the British stock connected with females of excellent properties of our native breed.

A. D., 1823.

Dr. Dexter declined a re-election as President, and Mr. Pomeroy as First Vice-President. The Hon. John Lowell was elected President, Hon. Thomas L. Winthrop, First Vice-President, Hon. Israel Thorndike, Second Vice-President, Hon. Richard Sullivan, Corresponding Secretary, and Gorham Parsons, Esq., Recording Secretary. Dr. Dexter continued in the Board as Trustee.

A premium was offered "to the owner of the best cultivated farm within the precincts of the several Agricultural Societies of this State;" the sum of thirty dollars each, in addition to the premium which might be awarded by such local society to the claimant; and it was agreed that the Trustees will accept as full evidence of the merits of such claim, a certificate signed by the President of the Society, certifying that the claimant was declared by the Society, or its Trustees, entitled to the premium within that district. It was, however, made a condition that the applicant shall be held bound, in all cases, to exhibit a statement of the extent of his farm, the state and plan of his farming buildings, his mode of collecting and managing manure, the number of domestic animals usually supported thereon, the quantity and quality of the land under cultivation, and his usual mode of culture, as well as the average amount of his crops of all sorts.

The first year of the New England Farmer having been completed, and it being represented that the patronage of it was unequal to its support, it was voted that from the able manner in which it was conducted, it was calculated to be highly beneficial to the farming interest; and it was recommended by the Trustees to the public, in the hope that there would be found a willingness on its part to increase the subscription, and thus secure to farmers this valuable vehicle of agricultural information.

A very superior short-horn Bull, was presented by Admiral Sir Isaac Coffin to the Society.

It was voted that for the season following the gift, he should be placed at the farm of John Prince, Esq., for the use of any

farmer, at five dollars for each cow; that in future years, he should be removed from time to time, to various parts of the Commonwealth, at the discretion of the Trustees; and in no case a higher price than the above should be charged, it being the wish to improve the stock of the county as rapidly as possible; at the same time, putting such a price for his use, as to prevent farmers from being careless of his progeny, and not so high as to prevent his general use.*

The Alderney bull, belonging to the Society, was sold.

A hay-making machine, worked by a horse, was presented to the Society, by E. S. Thomas, of Baltimore.

Mr. Francis Peabody, of Salem, presented to the Society three sheep, from the province of Astrachan, in Russia, remarkable for their excellence as mutton.

Hon. Thomas H. Perkins, also presented an improved breed of sheep.

The Annual Cattle Show was well attended, as usual. The Address was an informal one, by the President, Mr. Lowell, made previous to announcing the names and duties of the several committees on the awards of premiums, but distinguished like every thing that came from his lips or pen, by sound good sense and great practical knowledge.

Although the Trustees had been thus active and laborious in the cause in which they had embarked, both by their practical efforts in the cultivation of the soil, by their pens, their time and their money, there were not wanting those who decried their efforts, and endeavored to diminish their usefulness. The attacks came principally from those who had certainly not distinguished themselves for great liberality, zeal, or knowledge. Mr. Lowell, in an article under his own name, replied to them. The article is given at length, as it was published in the Massachusetts Journal, and would, with but little alteration, have been a fit reply by the Trustees to the attack made upon the Society, upon the occasion of a public discussion, in the Hall of the House of Representatives in Boston, in 1857.

* The pedigree of this Bull, named the Admiral, by the Trustees, obtained by Mr. Wetherell—North Star, dam by Cornet, grand-dam by Wellington, great grand-dam by Danby, North Star was by Cornet, &c., &c.

The History of the Massachusetts Agricultural Society—The recent attacks upon its management—General views on this subject.

One of the editors is induced to avow his agency in these remarks, because he would not commit his colleagues, and because he entertains no sentiments on this, or any other subject, which he feels the smallest desire to conceal. The Massachusetts Agricultural Society has been charged with inefficiency, it has been accused of arrogating to itself merits which belong exclusively to the Society in Berkshire, it has been attacked from another quarter for adopting bad regulations as to its premiums at the annual Cattle Show, and by both classes of fault-finders, it has been stigmatized as a set of "*Gentlemen Farmers*" publishing unfair accounts of experiments, or making manure, and breeding cattle in their libraries—all these sarcasms fall pointless—they do not excite a feeling of irritation but of regret, that in a cause, in which of all others, one might hope strife could never enter, a generous, noble cause, of advancing the best interests of our common country, such feelings should be indulged and avowed. The Massachusetts Agricultural Society, its members and its trustees, have never claimed any exclusive or peculiar merit. They have endeavored to promote the interests of agriculture which they believed *one* of the most and indeed *the most* important branch of human industry. Its annual products compared with all others, are at least as fifty to one. It was in a wretched state in 1792, when this society was incorporated, perhaps *never* lower. On recurring to the list of original members it will be found to embrace persons in all parts of Massachusetts and Maine, a least seven eighths of whom were chosen from *agricultural* counties. It will be found also to embrace a large number of the most venerable and honourable names then in Massachusetts. I need only mention John Adams, James Bowdoin, Samuel Adams, Fisher Ames, George Cabot, John Brooks, Francis Dana, Rev. Dr. Dean, the author of the New-England Farmer, Lieut. Governor Cushing, Dr. Cutler the Botanist, Dr. Dexter, Hon. Samuel Dexter, his son Samuel Dexter, Jr., Justin Ely, Dwight Foster, Hon. Elbridge Gerry late Governor, and Hon. Nathaniel Gorham former President of Congress, Christopher Gore, William Heath, John Hancock, the very popular patriot and Governor, General Lincoln, Levi Lincoln, late Lieut. Governor, Hon. George Leonard, Theodore Lyman, Jonathan Mason, Samuel Phillips formerly President of the Senate, and Lieut. Governor, Hon. Timothy Pickering, Hon. Thomas Russell, first President of the Society, and greatest benefactor, Hon. James Sullivan, late Governor of the State, David Sears, Hon. Increase Sumner, late governor of this State, Judge Sedgwick, Judge Sewall, General Shepherd, Thompson I. Skinner, Judge Simeon Strong, Hon. Cotton Tufts, Israel Thorndike, Henry Van Schaack of Pittsfield, Hon. Joseph B. Varnum, Hon. James Warren, of Plymouth, and a much greater number. Need I say, that the founders of this extensive Society entertained liberal views, that it embraced without distinction of parties, a large, I might almost say an infinitely great proportion of all

that Massachusetts then possessed of talent, intelligence, influence and virtue? Has this Society in any *one instance* departed from its original purity and principle? Has it suffered that worst of all scourges, *party spirit*, to enter, *even for a moment*, its threshold? We defy any man, (for it has no enemies, and therefore we shall not confine the challenge to them,) we defy any man to point out a case in which it has permitted this deplorable feeling to enter into its measures. Singly devoted to the interests of agriculture, it has viewed with delight the confidence of all parties in its integrity and impartiality. We need not say that its published communications have been as frequently from one party as from another. The only remaining question is whether they have fairly fulfilled the public expectations. In the first place it may be remarked, that they made a most liberal subscription to a common fund, which now amounts to thirteen hundred dollars a year. It will be found that this whole fund was principally raised by donations from *opulent* men. Mr. Russell being the largest contributor, Mr. Gore the second, and Mr. Bowdoin the third. The fund has been increased to its present amount by the care, intelligence and zeal of the Treasurers of the Society, by the disinterested conduct of the Trustees who have never expended one cent for their own advantage or entertainment, but have husbanded the funds as if they were their own. Now we confidently appeal to our liberal friends, and associates in the common cause in the distant counties, whether the opulent part of the Society should be reproached for their efforts which treasured up a fund to be employed whenever the state of intelligence in the country, and the progress of society should demand it? If it be asked whether the society did much in its infancy, we answer readily and frankly, no. But with still more confidence we add that it was not their fault. The institution was ahead of the age and of the intelligence of the state, and of public spirit. Its two first volumes will shew that the trustees were not remiss. Their queries distributed all over the state, prove their zeal, their intelligence, their intimate knowledge of the real wants of agriculture. No society in Europe or America ever issued a more valuable set of queries, and no society could at this day improve them, except by some trifling additions derived from new discoveries. But neither Europe nor America were prepared at that time for the improvements and experiments which have since taken place. It is praise enough, that the Massachusetts Agricultural Society was the third in order of time, framed, established, and endowed to promote the cause of Agriculture, (as we believe) in any part of the world and that it never lost sight of its object, and was always ready to encourage, and reward all attempts to improve any one branch of agriculture, and give publicity to any ingenious suggestions for the promotion of this art. Is there any solid reason for encouraging a distinction between *practical* and *theoretical* farmers? Or if it pleases our witty friends, *gentlemen* farmers? The last expression, however, in such a country as ours, is invidious; it tends to excite prejudices. It looks, as if the theoretical farmers claimed to be *above* the practical ones. It leads to distrust, and to the propagation of prejudices against the truth. We shall consider this question

more fully. A southern planter, like WASHINGTON, or Jefferson, or Madison, or Taylor of Caroline, the famous author of Arator, has no other dependence, we will suppose, and it is generally the case, but his land and his labourers. He never touches the plough personally, but upon its products, his fortune depends. He is educated as a farmer, he has no other employment, unless when called into public service. Can it be pretended, that as he directs all the operations of his own farm, changes them according to his experience, and his constantly increasing information from books and practice, that he is not as good a practical judge of practical farming, as a New England farmer who conducts his own plough? Have these southern planters who never personally labor, shewn any defect of skill? Have they not varied their cultivation, introduced not only new modes of culture, but new plants which have doubled the productions of the United States? In my early days, rice and indigo were almost the exclusive productions of South Carolina. We have seen the culture of cotton substituted, and exports to the amount of forty millions of dollars take the place of articles which did not yield perhaps ten millions. Would merely practical labouring farmers have been so likely to make these speculative changes? We think not. Let us proceed to New England. What natural obstacles should prevent President Adams, or Col. Pickering, or Mr. Gore, or Mr. Lyman, or Mr. Quincy, or Mr. Brooks, or Mr. Parsons, or the late Lieut. Governor Lincoln, or his son, from comprehending the principles of agriculture, or carefully and accurately weighing the facts which resulted from their experiments? I will grant, that as they may not *personally* labour, and may not as carefully superintend their labourers, they may not make as great profits as those who do, but they are as capable of keeping exact accounts of the comparative profits of one crop or another, to say the least. They can test, as well as the best *practical* farmer, the advantages of one mode of cultivation when compared with another. They can perceive the effects of different manures and of different crops. They can tell whether their cattle are or are not most economically supplied by pasturage or soiling. They can decide whether by cultivating corn only, or carrots, potatoes, Swedish turnips, and mangel wurtzel, they can have a greater surplus of hay, and support more stock. All these points, the theoretical farmer can decide as well as the others unless it be assumed that they are incapable of computing the lowest sums in arithmetic. But we do not mean to rest this question on this ground only. We assert, and mean to prove, that almost all the improvements of the agricultural art were the effects of the skill and industry of theoretical farmers, and that even the most familiar implements of husbandry now in so common use that our farmers believe that they always existed in their present state have been improved by the efforts of theoretical men. The plough of the Ancient Romans was a machine as different from ours as possible, and would excite the ridicule of the most ignorant farmer. Even the French farmers at this day have a most unwieldy plough, and their oxen draw this rude implement by their horns only. They have not yet learned the value of our yoke. Their hoes are most clumsy and inconvenient. Within three years a light hoe with

four steeled prongs has been introduced with us for digging potatoes, which is decidedly superior to the common one. Ploughs have undergone great changes and improvements chiefly by the inventions of theoretical men. The addition of the regulating wheel to the breaking up plough is found to be of great value. The progress of all these discoveries is slow, and nothing contributes to retard it, so much, as these occasional sneers at Theoretical Farmers. Gentlemen Farmers (if this term so unkind suits our friends better) are the Pioneers in agriculture in the same manner as mechanics in their workshops have been the pioneers in manufactures, and it would be as absurd to laugh at the barber, who introduced the Spinning Jenny in Great Britain which gave the first impulse to cotton manufactures, or at the American artist who invented the cotton gin, or at Fulton who first applied successfully the steam engine to navigation, on the ground, that the two first were not practical manufacturers, and the last not a practical navigator, as to contend, that President Jefferson's hill side plough was of no value, because he never turned over a furrow in his life.

Who was Olivier de Serres the father of French agriculture, or Evelyn the venerated author of the English Sylva, but *theoretical* farmers? Who was Duhamel the author of the best treatise on Fruits, and who contributed more than any other man to the present state of perfection of orchards, and of the finer fruits, but a theoretical man? Who has done the most in the present age to enlarge our knowledge of this branch of agriculture and horticulture? Thomas Andrew Knight, of Downton Castle, near Ludlow, who has added more new varieties to our fruits than any man living. We shall shew in the course of the present number that his zeal for the promotion of horticulture has been liberally extended to this country.

But it has been intimated that this central society had arrogated to itself merits, to which it was not entitled; that it had been tardy to do justice to the great and meritorious exertions of the Berkshire Society. This is unkind; we have always been prompt to acknowledge the early, efficient and intelligent efforts of that society. We have admitted that they were the first to give a spring to agricultural efforts by introducing the British and French system of public shows of cattle and manufactures. Still too much must not be claimed on this score. It was not an original thought. Many of us had visited the European shows, and the subject of introducing them had been discussed, and there can be no doubt, that long ere this, they would have been in full operation from the successful effect of European example. This is not said with a wish to diminish the merit of Mr. Watson, Mr. Gold, Mr. Melville, and Mr. Mackay, and the "other Gentlemen" Farmers of Berkshire. We know and acknowledge that they have done every thing in their power to promote an enlightened and improved course of agriculture, and surely they may be contented with this merit, without wishing to deprive other societies of their humble share in this common cause.

We most earnestly hope never again to see any invidious comparisons. It is much more easy to find fault, than it is to discover and propagate useful improvements. *We are all novices,* much more be-

hind the state of cultivation in the smallest State of Europe than our pride will admit. Either of the small Italian States, at least on the plains of Lombardy, or any district of the Netherlands could teach our best farmer that he knew but little of this important art. Let us all then be modest in our conscious ignorance and defects.

We have a few remarks to make as to the matter and manner of this journal. No men can be more sensible than we are of its imperfections. How can it be more respectable, when the whole State is so deficient in agricultural knowledge? Till within a few years, there were no books to inform us what were the modern improvements in more thickly settled and cultivated countries. Our whole library is still extremely meagre. Yet we are reproached with introducing articles which are above the capacity of common farmers. If it be intended as an intimation that we devote too large a proportion of this work to philosophical agriculture, we deny the fact; we always give the preference to homebred, practical essays and experiments. But we are not ready to admit that the introduction of rational and scientific speculations, such as those of Kirwan and Davy, is inexpedient. Massachusetts has scarcely a town which does not furnish educated men. Knowledge must be first communicated to them, and from them it will inevitably reach their less informed neighbours. We have devoted many pages to horticulture, to the best mode of raising vegetables and fruits for the table, and if we wish to rise one grade above mere subsistence, we must continue so to do. We shall devote a considerable portion of our journal to horticulture, orchards, and fruits. Massachusetts has fourteen large towns containing a population of one hundred thousand souls. When men are thus collected in great masses they will require the innocent luxuries of the table, and there are none more so than vegetables and fruits. To supply this population of one hundred thousand souls, fifty thousand at least must be employed. Thus nearly one third of the State are interested in acquiring horticultural information, in being taught to manage their gardens. Would you always continue in your present state of ignorance on these subjects? Shall it be said that from June to September in our scorching summers, a traveller may traverse Massachusetts from Boston to Albany, and not be able to procure a plate of fruit, except wild strawberries, blackberries, and whortleberries, unless from the hospitality of private gentlemen? It is painful to reflect, that every cottager in Flanders, Germany, Holland, and England, is better supplied with summer fruits than our most opulent farmers.

This almost utter neglect of cultivating summer and winter fruits, materially injures the health of our farmers. How mortifying to see the finest climate for the cultivation of the apple, so undervalued, that many of our farmers are obliged to slice up their summer fruit, and suspend it in the front of their houses to dry, in order that they may have a comparatively insipid and tasteless provision for winter! Yet such is too often, I may say too generally, the case.

The greatest benefit, however, which our farmers would derive from an attention to gardening, would be the acquisition of habits of care and neatness, which would be transferred to their farms.

If each farmer would devote two acres to a garden, and to finer fruits, he would be compelled to be more careful in trimming his trees, in sowing his seeds, in keeping them free from weeds. The habits thus formed would extend throughout his estate. We see this effect in farmers near the great towns; they learn to be their own grafters, and pruners, and their care of their general culture keeps pace with their progress in gardening.

But perhaps it will be replied, we cannot afford the time; it will be too expensive. What! cannot our farmers afford as much time as the common laborers of other countries who work from sunrise to sunset for from thirty to forty cents per day? No, this is not the real difficulty. It is, that the ease of getting an ample support in this country relaxes our exertions. But the progress of manufactures and population will soon bring about other habits, and we hope within a few years to see nurseries of the cherry, and the peach and the pear, as well as of the apple, in all country towns,—though we think, not only that the last is far the most important, but that it is with that, our internal improvements must commence. Till every farmer can lay up his ten barrels of excellent winter apples for his *own use*, we shall not expect much progress in other branches of gardening.

A. D., 1824.

Hon. William Prescott was elected a Trustee in the place of Mr. Perkins.

At the Annual Meeting it was voted "In the event of a vacancy in the Board of Trustees during the year for which they are elected, the Board shall have authority to fill such vacancy."

Admiral Sir Isaac Coffin presented to the Society a full-blood Hereford Bull and a full-blood Heifer of the same breed, raised by Sir J. G. Cotterel, Baronet; also, a full-blood Heifer of the short-horn breed, raised by the celebrated improver of that breed, John Wetherell, Esq., with their several pedigrees. They were taken in charge by the Trustees.

A letter was read from the Trustees of the Dummer Academy, proposing to the Trustees to take the patronage of the Dummer Academy for an Agricultural institution. The subject was referred to a Committee who made the following Report:—

"The Trustees fully impressed with the importance of such an institution, appointed a Committee to examine the farm owned by the Trustees of Dummer Academy, and to confer with

them on the best mode of carrying the plan into effect. The Committee reported that they thought the farm very well adapted to the purpose, that the Institution at Byfield offered great facilities for the execution of such an experiment, but that in their opinion it would be more desirable that its immediate management should be in the hands of the Trustees of Dummer Academy, and its supervision in such persons as the Legislature might think best; such, for example, as the Officers of the several Agricultural Societies in the State. The Trustees of the Massachusetts Agricultural Society have respectfully presented their views of the importance of such an institution, and their hope that it will meet with the approbation and be deemed worthy of the patronage and aid of the public. We most sincerely hope that the application will receive the attention and favor which its high importance demands. It is, we are aware, new —it is an experiment.—So *have been*, at first, all the improvements, from the time when men were clothed in sheep skins, and subsisted on wild honey and acorns. It seems to us time, that those who cultivate the ground, should, now that they are restored to their rights and dignity in the State, receive their fair share of public patronage and favor.

"Establishments for the advancement and perfection of their art should be made, and all the advantages of education, which their occupation requires, should be extended to them. As they have few or no opulent men among them who can found schools and colleges for them, let the public, who never forget them when money is to be raised, or battles to be fought, not overlook them when they ask a fair share of public bounty in return. They constitute the strength and will forever prove the safeguard of the State."

The Annual Show took place as usual. The number of entries, however, for premiums, was much less than in former years; though the animals, especially the dairy stock, was an improvement perhaps upon any previous year. This diminution in the number of competitors was caused principally by the increase of county agricultural societies, each drawing to itself the stock kept in its vicinity.

A. D., 1825.

No change took place in the Board this year.

The records bear witness again of the munificence of Admiral Sir Isaac Coffin, in sending as before, free of expense, to the Society, a stallion and a mare "of the Yorkshire Cleveland Bays," the most highly approved breed in England, for the coach and the road.

The Trustees made a new arrangement this year, with reference to the Annual Show. The usual public ceremonies were dispensed with, on account of the time they occupied, which could be more profitably spent by the various committees in awarding premiums. The annual address was likewise dispensed with, the proceedings being closed by an extemporaneous address by the President of the Society. By this arrangement the principal business was transacted on the first day, leaving time also for a sale at auction of cattle and other objects presented at the show. "Hitherto the sale being on the second day, not only obliged the owners of animals and of goods intended to be sold, to remain at great expense to attend the auction; but as the collection of persons who might become purchasers was much smaller on the second day than on the first, many if not the greater part of the benefits proposed by this fair were lost!"

The exhibition of fat cattle was excellent; "There were no less than thirteen animals, weighing from 1673 to 2319 pounds, and from five to seven years of age. In every case but one they had been inured to hard labor, and in every case, the *expense* of feed in fatting was far less than English writers give as the average cost of fatting in England. Their food had been generally what is called cob-meal, that is the corn and cob of Indian corn ground together."

A letter from Mr. Pomeroy was received stating that Mr. Dabney of Fayal had sent, for the use of the Society, a present of another quarter-cask of wine, and it was voted (cider, beer, wine and other similar beverages not then being proscribed by law) that the thanks of the Board be presented to Mr. Dabney for his expression of generous interest and ready co operation to promote the objects of the society.

A. D., 1826.

Hon. Josiah Quincy retired from the Board and Jonathan Amory, Esq. was elected to fill his place as one of the Trustees.

The publication of the Society's Journal, heretofore semi-annual, was made annual.

A Committee was appointed to sell and dispose of all the animals belonging to the Society, at private or public sale at cattle shows, the object being to disseminate the stock throughout the Commonwealth.

The Society's gold medal of the value of fifty dollars, was presented to Thomas Andrew Knight, Esq. of Downton Castle, England, as a tribute to an eminent philologist,* and a liberal benefactor to the new world.

The Committee on Agricultural Experiments made their report. There were only four applications for premiums in this department, owing to the singular weather of the past summer.

The following letter was written by one of the Trustees, Mr. Welles, for the Journal. The subject is one of interest to all.

Boston, Feb. 1, 1826.

To the Corresponding Secretary of the Massachusetts Agricultural Society.

The appendix promised to the remarks made in the preceding numbers of the Agricultural Repository as to the age and peculiar circumstances of the Orchard and Forest, have been submitted as to the former. Those on the Forest now follow.

It may be thought somewhat too excursive for the object and character of this Journal, which aims at improvement in annual crops, or more immediate practical results, to look so far back, and with too little certainty, for the laws which govern vegetable life, that we may be instructed for the future.

But the reign of this monarch of the vegetable kingdom extends through so many generations, and is yet so undefined, that we are prompted to inquiry and research by something more than curiosity.

It is surprising what a degree of uncertainty generally exists as to the age of Trees beyond a given period. It is but very seldom that any corporate or other records occur that can be satisfactorily relied on. In general they are presumed to have been set out when the

* This vote implies an evident confounding of two brothers, Richard Payne Knight and his brother Thomas; the former a celebrated classic scholar, known as *Grecian* Payne Knight, and the latter the most eminent horticulturalist of his day.

house was built near which they stand, or by tradition, which is liable to great inaccuracy, by some predecessor far removed. In some instances which will follow, a sufficient degree of accuracy has been arrived at. Others are left to inference, with such light as could be had on the subject. Amongst the instances best ascertained are two valuable Elms, lately standing before the house in Natick, formerly occupied by the Rev. Oliver Peabody, the successor of the celebrated Elliot, the Indian Apostle, so called. The latter made only occasional visits, though so acceptable to the Indians here placed, as to have received many testimonials from them, besides the orchard before mentioned.

Mr. Peabody was settled in the ministry to the Indians in Natick, in the year 1722, and it has often been told me by his daughter, (some time since deceased,) as well as by others, that a deputation of Indians came, one bearing two Elm trees on his shoulders; that they presented themselves and requested permission of their minister to be allowed to set out those trees before his door, as a mark of their regard, or as the *Tree of Friendship.*

These trees flourished for about ninety years, when the larger one was stricken by lightning, and soon after failed. The other is in a state of decisive decline. These measured, one foot from the ground, about 21 feet, and in the smallest part, for 14 feet up, 13 feet. The growth was about 1½ inches per year. The Rev. O. Peabody died in 1752, after 30 years' ministry.

In 1753 the Rev. Stephen Badger was settled as the successor of the last mentioned gentleman. A like request was made by the Indians, and the same ceremonies took place in planting the Trees of Friendship before the door of Rev. Mr. Badger. These trees are now in full vigour, having been set out 73 years. They are about 15 feet in circumference, near the ground, and nine feet above in the smaller part, and have given, in circumference, nearly 1½ inches growth a year.

The Elm attains a great size in lighter soils, and on plains, commons, highways, &c. Cambridge has produced several that have been remarkable; there is one on the common that measures, near the ground, about 16 feet, above, 13 feet; another spreads to 22 feet, and is, above, 12 feet.

There was in the College Yard a very fine Elm, which was unfortunately destroyed, as is said, by the great quantity of pickle thrown about it when our troops occupied the colleges during the revolutionary war.

Of another, Professor Sewall in his Eulogy on Dr. Winthrop thus speaks: "Under a venerable Tree, lately standing on our common, Governor Winthrop was wont to call together his little senate."

In Framingham there is one in the highway near the house of Mr. Haven, set out by his father about 90 years since. It measures, a foot from the ground, 20 feet; it is of great height, and is, for 10 feet above, 12 feet.

There are several more in Framingham, Stow, &c. of great beauty, which nearly correspond in measure, being near the ground about 18 feet, and above, about 13 feet.

In Lancaster there are many much admired Elms—two of which measure on the ground, 19 feet. That by the house of Wm. Stedman, Esq., set out by Col. Willard, is of great beauty. It retains its size far up about 15 feet.

In Essex several are spoken of. One which was cut down in Salem not long since, it is there thought would outdo all competition. Another on Mr. Crowninshield's farm measures, one foot from the ground, 22 feet; four feet above, 14 feet.

There are two fine Elms on Mr. Lowell's estate, in Roxbury, one of which spreads remarkably near the ground, to 27 feet, and is above about 18 feet.

There is a remarkable Elm Tree about three miles from Providence, as to which the Marshal of Rhode Island, the late E. Dexter, Esq. wrote me: "I have measured the Elm in Johnston, as you requested. It is, three feet from the ground, 21½ feet, and holds nearly that size for 12 feet. Mr. King, the owner, informed me that it was computed to contain 12 cords of wood."

Of the trees which have excited notice in this city there is no certainty as to the age of those in the Mall, on the border of the Common. But of those in what is called the Short Mall, east of the burial ground, Major Bumstead states, "That in the year 1762, the planting of the trees in Common street took place by Major Adino Paddock and John Ballard. These trees, several of them, measure about nine feet at four feet from the ground, and give a growth of over 1½ inches in circumference in a year. They are what we here call the English Elm.

Liberty Tree, so called, stood at about 50 feet from the corner of Essex street. It was a fine majestic tree, overshadowing the house at the corner, of the proprietor Mr. Elliott, a bookbinder. In this building, then plaistered and of antique form, but now changed in its exterior, was a Hall, large for the times, of about 20 feet square, where the Whigs used to assemble. These meetings imparted to the tree a great degree of notoriety. As early as 1765 a sort of effigy of the Earl of Bute was suspended therefrom. Afterwards Mr. Andrew Oliver, who was stamp master, made his recantation under it. Notices were placed thereon, and many public acts and ceremonies were here had, as the journals of those times will more particularly show.

The tree near Castle street has been often remarked upon. It was lately prostrated by the axe to make way for a block of buildings. It measured at two feet from the ground about 13 feet, and by counting the rings would be deemed about 110 years old.

But, after all our research, the *Elm* of *Boston Common* overtops its race, and stands pre-eminent in this neighborhood at least. It is a beautiful and finely proportioned object; near the ground it measures 23 feet, and about three feet above 20 feet in circumference. There are many rumours as to the setting out of this tree. Amongst the most probable there is one that an ancestor of Governor Hancock's family, Deacon Henchman, was the individual who conferred this benefit on the public.

In closing these notices of the Elm, it may be considered not improper to notice a publication stating the measurement of the Elm in Hatfield as of 34 feet in circumference at two feet from the ground, and 24 feet 8 inches above, with a supposition that it was the largest tree in New England. The Gazette of Northampton states that there are several Elms which would compete therewith in that place, measuring 21, 22, and even 25 feet, and that one is said to measure 28 feet at some distance above the ground. If these are given correctly, they are of extraordinary magnitude.

The Chestnut, though it is not thought to compare with the Elm as an ornamental tree, may yet vie with it in size, and is of more value for timber. The measure of three only will be given. One in Holden is at the ground 21 feet, and narrows but little above. Two in the lot of Mr. Valentine, in Hopkinton, one is 25½ feet, and above 17½ feet. The other is at the surface 23 feet, soon dividing into separate limbs.

The Oak is in all probability the most long lived of the forest. In the lot in Dorchester, given by Gov. Stoughton for the benefit of college education, to Dorchester scholars, I have measured several white oaks, which are from 18 to 20 feet circumference, and in one of them counted upwards of 200 rings, indicating as many years. The black oak has been found to attain about the same size.

I close with the dimensions of the Hartford White Oak or Charter Tree, so often alluded to. It is at the ground 36 feet, and in the smallest part 25 feet. The manner in which the Charter was concealed in it is matter of history and before the public.

I have in the paper on the forest said that the time when trees were most advantageously cut was when the period of quickest growth is over.

I shall be gratified if what has been submitted conduces to the better management of the woodlot. Or if by showing how our commons, highways, and pleasure grounds have been adorned and made interesting by those who have preceded us, I can excite or strengthen any efforts to the promotion of objects of such utility.

I am, sir, respectfully yours,

JOHN WELLES.

A. D., 1827.

Mr. Prince was succeeded as Treasurer by John Heard, jr., Esq., and John C. Gray, Esq. was elected Trustee in the place of Dr. Dexter.

The Annual Show this year was confined to one day, which is thus briefly noticed in the Record Book of the Society.

"It having been announced by the Committee of Arrangements, that the proceedings which had previously occupied two days, should all be held in one, the Committees immediately proceeded to their respective examinations, made their reports, and at two o'clock, after a preliminary address from the Chair, the premiums were declared by the Assistant Recording Secretary, and after votes of thanks to the Marshals, &c., the Society proceeded to the dinner provided at the hotel, and concluded the labors of two days in one very successfully."

In addition to the usual premiums for the year, the Trustees offered one hundred and fifty dollars for the best and most effectual mode of extirpating the worm from the locust, if it can be made effectual and economical; also, fifty dollars for the discovery of some new and effectual means of preventing the ravages of the borer in the apple trees, and one hundred dollars for the best plantation of white mulberry trees. This last premium was offered, in consequence of the great attention which the subject of raising silk was then receiving.

General Coffin presented to the Society four rams and three ewes of the celebrated "Devonshire Nott Sheep." One ram and ewe was sent to the Worcester County Society and one ram and ewe to the Hampshire Society.

The periodical publication of the Society's Journal was discontinued after the July number of this year, (1827.) The next number was not issued until 1830, for the reason stated in a succeeding number, published in 1832. "It was owing to the rapidly increasing circulation and growing value of these (agricultural) newspapers, that the Trustees of the Massachusetts Agricultural Society have been induced to suspend, for some time past, their publications. The newspapers seemed to them to supersede the necessity of their exertions, while their publications might seem in some degree to check the subscriptions and circulation of these more useful means of instruction. The Trustees were, however, induced to issue the present number, because the length of the reports of their committees, and the importance of that upon farms particularly, seemed to require this change. They could hardly expect that the New England Farmer should devote so much of its columns to the reports of

any single society; and it moreover seemed to the Trustees to be expedient, that their reports should be presented in such a form, as that those, who might wish to preserve them, might add them to the former volumes of their Journal."

The publication of the reports on the cattle show, upon crops, experiments, &c., resulted in the establishment of the present valuable abstract of the returns of all the Societies, first under the direction of the Secretary of State, and now, by the Secretary of the Board of Agriculture.

A. D., 1828.

Hon. Thomas L. Winthrop was elected President in the place of Mr. Lowell, whose activity and zeal for many years in the cause of agriculture and horticulture, are manifest on every page of the Society's Transactions, and whose services were still continued as Corresponding Secretary, in the place of Mr. Sullivan, who remained in the Board as a Trustee. Col. Thomas H. Perkins was elected Second Vice-President.

A Committee was appointed to co-operate with other Agricultural Societies, in obtaining a continuation of the grant for premiums from the Legislature, and the Treasurer was empowered to borrow, if necessary, five hundred dollars, to enable him to pay the premiums to be awarded at the show.

In reference to the subject of State aid, the Trustees, in their report of the proceedings at the Brighton Show of October, 1827, say:

From the commencement of the annual cattle show at Brighton, it has been the invariable practice of the Trustees of the Massachusetts Society for promoting agriculture to publish, in their *own* journal, all the reports of the committees appointed to award premiums. Indeed it is the practice of all the European Societies. The French society for the encouragement of the arts, and of agriculture, publish a volume of 300 pages containing all the details of their triennial exhibition. The uses and benefits of such a publication are too obvious to require elucidation. It furnishes in a more permanent form, than

any newspaper can secure, a history of the progress of art, of itself curious and interesting. It affords the best evidence of the activity and beneficial effects of the society. It is the best reward, which can be offered to the intelligent and successful cultivator, or mechanist, often of much greater value to him, than any pecuniary premium. Hence we invariably find, that inventors of useful implements are very anxious to have their inventions favorably spoken of, even if they are judged not to come within the scope of our premiums.

Some persons may think, that the publication in one newspaper is sufficient, and that the pages of our journal should not be occupied by matter *once* published in *another* form. We think otherwise; our journal is taken by many, who do not, we are sorry to say, take the valuable paper, the New England Farmer, in which our reports are first published. Such persons, having paid for our journal, think they have a right to possess the proceedings of our board. Others, who take the New England Farmer, and who are possessors of complete sets of our journal may prefer to have these proceedings in that form, which they may think more convenient for preservation. There are many persons who take our journal, in *other* states, who do not take the New England Farmer.

These reasons have satisfied us, that the course we have adopted is a proper one. We could, indeed, withhold the publication of our reports from the public journals; but besides that such a course would be churlish, or at least ungracious, the competitors would be dissatisfied with such a delay. We would hazard another remark, that there is a too strong disposition in *all* the editors of public journals to decline copying from each other. The public, in consequence, lose a great amount of interesting information. Instead of the result of many intelligent minds, you obtain (if you take but one or two publications) only the thoughts and the labours of the one or two, to which you subscribe. Our rule is different. We select from all sources, what we think interesting in them.

For example.—The American Farmer is a very interesting work, more adapted to be sure, to the state of agriculture in the middle and southern states than our own. Few farmers in this state ever see it. Yet there are often interesting discussions in that able journal, which would be read with pleasure and profit, by that class of our practical farmers, who have not an instinctive dread of knowledge, or an unhappy contempt for all, who unite reading with practice. There are two other works of another description, the Memoirs of the New-York Agricultural Society, and of the two Pennsylvania Societies; both of which are full of interesting matter. We avow, that we feel no such pride of authorship, as to fill our journal with our *own* remarks, when we perceive, that another work seldom or never seen by our citizens, contains more valuable materials than any which we could, at the time, furnish.

In this connexion, we, with unfeigned respect, and with that submission, which as good citizens, we are bound to cherish towards the government, which protects us, would beg leave to advert to a proposition, made in a former Legislature, to repeal the law affording a patronage to the Massachusetts Society for promoting agriculture.

Unquestionably, it is not only the right but the solemn duty of the Legislature to withdraw its support from any institution, which it may have patronized, whenever it shall discover that its bounty has been of no, or of little public value, or if that bounty has been misapplied. In the year 1792 the Legislature saw fit to incorporate a body, comprising members from every part of the state, including Maine, for the purpose of fostering the interests of agriculture, and of affording to a class of citizens, comprising three fourths of the whole population, the means of knowing, not only the improvements in their art, which should be made in Europe, but the *local* improvements made by skilful and ingenious farmers in our own country. The extent of the patronage amounted to a grant of a township of Eastern lands, then worth in the market about 2000 dollars, and the payment of the expense of printing their proceedings, which for many years did not exceed two hundred dollars per annum, equivalent to *half* of *one day's* pay of the members of the Legislature. When our society became more active, and published two numbers a year, it amounted to four hundred dollars a year. For this trifling sum, the Massachusetts Society for promoting agriculture, furnished from 400 to 600 copies to the members of the Legislature, gratis, and thus enabled them to carry home to their respective towns, the result of the labors of the Society, and thus to spread them throughout the state. It may be said, however, that they were of *no value.* It does not become us to say, that they were; but we may be permitted to state the facts, that our journals have been subscribed for, by many citizens of this state, and of other states, and of the British Provinces adjoining to us; that they have been spoken of with great commendation in this country and in Europe; that they have been preserved and bound up by hundreds of individuals, and that they, in fact, contain, as great a mass of information from practical farmers, on the great subjects of agriculture—on cattle—the making of butter, cheese and cider, on *general* cultivation, and on horticulture, as can be found in any equal number of volumes. That errors have been often found in them, and incorrect opinions advanced is true, but it is not more true, than it is of other miscellaneous journals. The only way of eliciting truth is a free discussion, and if one writer errs, ten are found to correct the error. The Massachusetts society for promoting agriculture are not benefited by the grant in question.

The only effect of withdrawing it, would be, to oblige them to withhold an equal amount of premiums, which they now grant to every part of the state. Three fourths of their premiums are dispersed in counties not contiguous to the capital. If the agricultural interest are convinced that their art *cannot* be improved, or is *not* improved by our efforts, or if they think, that the small bounty they now bestow, is productive of less advantage than the diminutive sum, which they pay, they *ought* to withhold it, and we shall cheerfully submit, and rely upon our own diminished means, to do as much good as we can. We are free to say, however, as we have a right to say, that the policy of the proposed measure is at least questionable. We are aware that these remarks will be too late to affect in any way (even if they deserve it) the decision of the Legislature; yet they may pro-

duce some effect on *public opinion*, and at some future period, induce the Legislature to grant *something* for that great body, who pay, and who, by their industry, contribute so much to the strength and prosperity of the state.

The Massachusetts Agricultural Society can say *something* in their own behalf. While our two public ministers, Livingston and Humphreys, are entitled to credit from the introduction of merino sheep, it should be recollected, that the Massachusetts Society was the *first by its premiums* to encourage their introduction, and thus destroyed the monopoly, which these gentlemen, for many years, enjoyed. In the same manner, they encouraged the introduction of long woolled sheep, and they have been the organs, through whom many other fine animals have been introduced into the state. To agriculture, they have been of no small service, in introducing root culture, and to horticulture, they humbly believe, they have rendered invaluable services, by introducing many culinary plants now in common use, and deemed indispensable in the great markets; while they have added a long catalogue to the mean list of fruits, which Massachusetts possessed thirty years since. Still, if the Legislature esteem these efforts of less value, than the small annuity, which they commit to them, as public stewards for the general welfare, they will never hear a word of complaint from this society.

The result of the exertions of the friends of the Society, was to extend by the Legislature the act of 1819, for the encouragement of agriculture, for the further term of five years.

It was voted that the Committee on Eastern Lands be authorized to receive, if they think best, a deed of half a township, granted where a whole one was claimed, and also to take one already surveyed or not, at their discretion.

A. D., 1829.

Hon. Israel Thorndike and Col. Thomas H. Perkins retired, and their places, as First and Second Vice-President, were supplied by the election of Hon. Peter C. Brooks and Hon. John Welles; Dr. James Jackson and Hon. Israel Thorndike were elected Trustees.

One of the subjects of discussion before the Committee on Agricultural Experiments, was the propriety of awarding a premium and withholding from the public, the name of the person

to whom it was given. It was decided that it would be proper to do so. It is doubtful whether such a measure, however, is satisfactory to the public, who naturally suspect the impartiality of the award, not knowing the receiver of the premium.

A letter was received from Dr. Porter, giving an account of his discovering of a new grass, which with the advice of Dr. Torrey, of New York, he called the *poa elongata.*

A. D., 1830.

In the Board of Officers this year, Richard Sullivan, Esq., was chosen Corresponding Secretary, in the place of Hon. John Lowell, and Hon. Benjamin Gorham was chosen Trustee, in Mr. Sullivan's place. Mr. Gorham declined accepting.

A Committee was appointed to consider the expediency of changing the mode of premiums for stock, and altering the period of the show from annual to biennial, triennial, or even to once in four or five years. The Committee subsequently reported, that it would be best, in their opinion, to omit holding the show the ensuing year.

A communication from Col. Jaques was laid before the Board, requesting aid in the purchase of a farm, to be carried on as an experimental farm, both in the cultivation of land and the rearing of stock. The Committee to whom the matter was referred, recommended the granting the request, and after full discussion the report was accepted, and the sum of five thousand dollars was ordered to be subscribed.

Hon. Thomas L. Winthrop presented a new seal to the Society, to replace the one which had been burnt.

At a meeting of the Trustees in March, 1831, several gentlemen of the Board of Visitors of the Massachusetts Professorship of Natural History being present, viz.: Hon. Josiah Quincy, President of Harvard College, Dr. Bowditch, President of the Academy of Arts and Sciences, and Mr. Lowell, of the Committee on the Garden, the subject of relinquishing the duty of

visitors was discussed, the grant of the Legislature in aid of this object being now withheld; and the whole matter was referred to a Committee, with instructions to confer with the President and Fellows of Harvard College, in relation to it. At the same meeting, the sum of six hundred dollars, received by the Trustees from the Commonwealth, was paid over to the College, for the use of the Botanic Garden.

Subsequently the Committee reported in favor of relinquishing the office of Visitors; the report was accepted, and the duty of visitation devolved in course, and became vested in the President and Fellows of Harvard College.

The assessment on becoming a member of the Society was reduced from five to three dollars, there being no regular publication of the Agricultural Journal.

The address at the annual show was delivered by John C. Gray, Esq. He gave a sketch of the progress which Agriculture had made and was making in the State, particularly in relation to our *domestic animals,* which was mostly attributable to the establishment of Agricultural Societies, exciting farmers to the introduction of improved breeds and stimulating them to improve our own, by better care in rearing, as well as better selection in breeding.

In looking over the Reports of the Committees, we find the stock from the bulls Holderness, Denton, Cœlebs, and other imported stock, taking a large proportion of the premiums.

For the *one hundred dollar premium,* for butter, there was a large competition, and it being open to all the States, there were thirty-five entries from five different States. It was awarded to Mr. Henry Sprague, of Charlton, for six kegs, with flat hoops, and a second premium of fifty dollars to Mr. Moses Newell, of West Newbury. The butter was afterwards sold at auction, varying in price from 14 cents to 36 cents, the premium lots bringing the highest on the list.

The Report of the Committee on Farms, which was drawn up by Mr. Prescott, in his usual clear and methodical manner, is well worthy of preservation as a *model report.* In relation to the difficulties attendant upon the award of premiums on farm management by the Trustees, from the impracticability of an

actual inspection of farms over the whole State by any one committee, he says, "To remedy these disadvantages as far as possible, the Trustees accompanied their offer of premiums with the requirement of a full and particular statement, by every applicant, of the number of acres in his farm, the quality of the soil, the proportion of tillage, mowing and pasture, his manner of making manure, the quantity and manner of using it, the rotation of crops he found most successful, and the quantities of these crops, and other particulars specified in their publication in January last, announcing the premiums they proposed to give. These statements it was intended should, like specifications annexed to patents for manufactures, be so full and particular, as to enable any intelligent farmer, who should read them, to adopt the whole or so much as he thought applicable in the management of his own farm. Applications it was expected would be numerous, and the statements accompanying them, when published, it was thought, would impart to agriculturalists information adapted to their case, and on which they might safely rely.

"By these they might learn the opinions and practice of skilful and practical farmers, who cultivated the same kind of soil, and paid like prices of labor with themselves. The high character of our respectable farmers for veracity and fairness, was considered a sufficient pledge against any intentional misrepresentation or unfairness; and if it should happen that some of the statements should be a little exaggerated, it was thought the evil could not be great; since at the worst, it would be the statement of a good farmer, of what he considered the best way of cultivating such land, with perhaps a slight exaggeration of his crops. Even this might be more safely trusted, and be more useful, than a mere theoretical essay of an inexperienced man."

The first premium was awarded to Mr. Erastus Ware, of Salem, who rented the Pickman farm.

A. D., 1831.

Hon. John Lowell took the place of Dr. Jackson, in the Board of Trustees, and S. G. Perkins, Esq., was elected in the place of Hon. Benjamin Gorham.

The President reported progress and left copies of the papers, in relation to the claim for half a township of land in the State of Maine.

There was no show held this year, being the first omission of one since the commencement in 1816. In announcing the resumption of the annual show for the year following, after speaking of the benefits which had accrued from their establishment, the credit of which they accord to the Berkshire Society, whose first show took place in 1814, the Trustees say, "But having set the example, encouraged the farmers by these exhibitions, and seeing societies established throughout the State, we doubted whether any future exhibitions at Brighton would any longer be of use. The fatigue, trouble and expense to the Trustees, and the diminution of their funds, would of course lead them to discontinue them, as soon as any doubts were suggested as to their utility. Such doubts met them from many sources, and they suspended them in obedience to these suggestions, and in the hope that the suspension of their public shows would have the tendency to increase the exhibitions of other County societies, which had sprung up in every part of the State."

Although there was no show, the Trustees offered nearly two thousand dollars in premiums for farm management, dairy products, field and forest culture, agricultural inventions and improvements. The premiums for butter and cheese alone, amounted to five hundred dollars, bringing out seventy competitors. Luther Chamberlain took the first premium of one hundred dollars on butter.

A. D., 1832.

The only change in the Board this year was the election of John Prince, Esq., as a Trustee, in the place of Mr. Perkins, who had resigned.

The omission of the show the previous year, gave great dissatisfaction to the people of Brighton, and the southern counties where societies had not been established. The Trustees therefore decided upon having one as usual this year, limiting it, however, to one day. It was not to be concealed, that though the premiums were exceedingly liberal, the competition was growing less, and narrowed to a much smaller district. At the same time, the Trustees were reluctant to abandon what had become, as it were, an institution and identified with the labors of the Society.

The show this year, though in many respects satisfactory, was not up to the standard of past experience.

A. D., 1833.

Hon. Daniel Webster, and Henry Codman, Esq., were elected in the place of Mr. Parsons, resigned, and Mr. Prince, who declined a re-election as Trustee.

A pamphlet on certain agricultural machines* was received from Mr. Fellenburg, of Hoffwyl, in Switzerland, and a translation of it having been made, the President and Mr. Prescott were appointed a Committee to examine the same, and if in their opinion it would contribute to the advantage of Agriculture, to order one or more, to do so, and to print the translation in the New England Farmer, or otherwise.

The Treasurer was authorized by vote, to pay any bill not exceeding twenty dollars, at his discretion, without a formal vote of the Trustees.

Hon. Edward Everett delivered the address at the cattle show.

* The character of the machines is not stated.

A. D., 1834.

Hon. John C. Gray was elected Recording Secretary, and Josiah Quincy, jr., Esq., a Trustee.

It was decided after several discussions, to omit the cattle show this year, and the premium list was accordingly arranged with reference to this omission.

The hall of the Rotunda over Faneuil Hall Market, was placed at the disposal of the Trustees, by the lessees, Messrs. Livermore and Kendall, for the examination, exhibition and sale of butter and cheese, under the direction of the Trustees, and in connection with their premiums offered for these articles.

A letter was received and read from Martin Brimmer, Esq., accompanied with some hybrid turnip seed, and a pamphlet brought by him from Scotland.* With the thanks of the Society, a hope was expressed that other gentlemen, when travelling abroad, would follow his example, and bring back with them new seeds and fruits, and thereby promote the agricultural interests of the country.

After much negociation and many delays, the deed of half a township of land, in the State of Maine, was obtained from the State of Massachusetts, a full township having been granted to the Society, in aid of the Professorship of Natural History. Between the time, however, of obtaining the grant and receiving the deed, Maine became a separate State, and the public lands were divided between the two States. Several attempts were made to obtain the other half from the State of Maine, but they were ineffectual. The half township received from Massachusetts was sold, and the proceeds, $15,000, were paid over to Harvard College, now become the visitors of the Professorship.

* It was about this time that the turnip culture began to revolutionize the agriculture of Scotland.

A. D., 1835.

John Heard, Esq., was chosen Corresponding Secretary, in the place of Richard Sullivan, Esq., and Henry Codman, Esq., Treasurer. Henry Codman's place in the Board of Trustees was filled by Hon. Abbott Lawrence.

A machine for sowing grain having been imported and placed in the hands of Mr. Phinney for trial, he reported favorably of it; also, a report from Dr. J. M. Whittemore, of Brighton, of good results from the use of Fellenburg's machines.

A bull and three cows, of the Ayrshire breed, were imported by the Trustees, at a cost of eleven hundred and seventy dollars.

The address at the annual show was delivered by Gen. H. A. S. Dearborn.

A. D., 1836.

The same Board was continued in office.

Measures were taken to ascertain the probable advantage in an agricultural point of view, of the culture of the beet for the manufacture of sugar.

A present of books was made to the Society, by the Agricultural Society of Caen in Normandy.

A letter was received from Rev. Henry Colman, suggesting the advantage of an accurate and full agricultural survey of every town in the Commonwealth, with a detailed report of the same. The communication was referred to Mr. Prescott, Mr. Brooks, and Mr. Heard, to act upon and to report in relation to it. This committee at a subsequent meeting reported verbally, that having been notified by the Committee on Agriculture of the Legislature, that a meeting would be held to inquire into the expediency of ordering such an agricultural survey, and the opinion of the Trustees of this Society being desired, they attended before that Committee, and stated their individual opinions, that such a survey would be advantageous to the agricultural interest of the State.

After some discussion, it was voted to be inexpedient to have a cattle show the approaching season.

At the request of the Berkshire Agricultural Society, it was allowed the use of the Ayrshire bull.

Among the premiums offered this year, was one of one hundred dollars each year, to the person, persons, or corporation who shall raise the greatest quantity of sugar beets, by the acre, or not less than two acres, which shall be manufactured into sugar, in the years 1837, 1838 and 1839, giving a particular account of the manner of sowing, cultivating, and gathering the beets.

A premium of the same amount was likewise offered to the person, persons or company who should, during the same years, manufacture the greatest quantity, and of the best quality of sugar from beets, giving a full account of the process of the manufacture.

The invested funds and cash of the society amounted, at this time, to twelve thousand nine hundred and fourteen dollars. There had been no increase of them for many years, the income of the society, as well as a part of the donations to it having been applied to premiums of various kinds, and very largely to the Botanic Garden. It was thought by many, that it was now time to attempt a new field of usefulness, by a systematic introduction of improved breeds of cattle. To do this, it required large outlays in the purchase and importation, as well as a continuous expense in the proper care of the stock after its arrival, consequently, for several years successively, the amount paid out in premiums was sensibly reduced, and a portion of the society's income was reserved and invested, with the view to more efficient action hereafter.

A. D., 1837.

The only change that took place in the Board this year was the election of Elias Phinney, Esq., in the place of Hon. Israel Thorndike. J. P. Cushing, Esq., was previously elected, but declined serving.

A vote was passed, that the Committee having charge of the Ayrshire Stock, be authorized to make such disposition of the cows and their progeny as shall give one calf to be the property of each Trustee who will keep a cow for one year, on condition that the same shall be raised, and the blood kept pure.

It was voted to hold a cattle show this year at Brighton. There was some discussion on the subject of returning to Government the money that was received, and not expended, for premiums. It was determined that it was not necessary to make the expenditure within the year, and the money was retained to be applied to premiums in the following year.

A. D., 1838.

No change took place in the Board this year.

The by-law, requiring nine members to form a quorum, was repealed, and it was voted that any members of the Society who attended the meetings, should be authorized to transact business.

A communication to the President was read, inquiring if aid could be afforded to erect a monument to the memory of the late Thomas Green Fessenden, for many years the proprietor of the New England Farmer. The subject was referred to a Committee of three—Mr. Phinney, Mr. Codman, and Mr. Welles. Agreeably to the recommendation of this Committee, it was voted that the sum of one hundred dollars be used at their discretion, for the purpose above specified.

It was voted to pay to the Rev. Mr. Allen the sum of one hundred dollars, for his services as Agent of the Committee on Farms.

The Committee on Farms reported that, from the similarity in the description, culture, and results of the farms, for which the premiums were claimed, they were unable to give so decided a preference to any one, as to justify the awarding of the first premium. It was voted, therefore, that the Committee be authorized to distribute the whole sum—six hundred dollars—

offered in premiums to the best farms, among the claimants in gratuities to each, in such amounts respectively, as it may judge best.

It was decided to omit the cattle show this year.

Mr. Phinney was authorized to offer a premium of thirty dollars, as an inducement to a mechanic to construct, and introduce for the use of farmers, a sub-soil plough.

A letter from the Worcester County Agricultural Society was read, offering to this Board the use of pens and every facility in preparation, and for the care of animals, if they would grant premiums on stock to be exhibited at Worcester, in October. A similar request was made by the Berkshire Agricultural Society.

The sum of two hundred dollars, in accordance with these requests, was appropriated to be given in premiums at the cattle show in Pittsfield, and the same amount at the cattle show in Worcester.

Nine hundred dollars were distributed in various premiums, of which two hundred and sixty dollars were awarded in premiums for butter and cheese.

A. D., 1839.

Josiah Quincy, jr., Esq., was elected Recording Secretary, the office having become vacant by the death of Mr. Heard, and Dr. John C. Warren, in the place of Hon. Daniel Webster, who had withdrawn.

Mr. Codman exhibited samples of sugar, made from the beet by Mr. Duroy, with an offer from him to take machinery to any set of farmers who would offer him employment enough to return him his expenses.

Mr. Colman, the Commissioner of Agriculture for the Commonwealth, having represented to the Trustees, that, in his opinion, much useful information respecting the cultivation of the mulberry and the manufacture of silk might be obtained at

a meeting of the Silk Convention, to be held on the 11th of December at Washington, and having also expressed a willingness to attend if his expenses could be paid, which would probably not exceed sixty dollars, the Treasurer was authorized to pay that sum to Mr. Colman for that purpose.

The Committee on Experiments and Inventions recommended the award of the premium of one hundred dollars, to the Northampton Beet Sugar Company, for having manufactured sugar from the sugar beet in the greatest quantity and of the best quality, having made the statements that were required to accompany the application.

The year 1840 was made sadly memorable in the Society's annals, by the death of Mr. Lowell.

A gratuity of a silver creampot, of the value of twelve dollars, was awarded to Mrs. Blake, on the farm of Mr. Denny at Westborough, for a quantity of excellent butter. In all, the premiums for this year amounted to eleven hundred and ninety dollars; four hundred dollars being given to county societies for distribution; four hundred and fifty on farms, and the remainder for various other objects connected with agriculture.

A. D., 1840.

The Board remained unchanged this year.

The Committee appointed to attend the Essex Cattle Show were authorized and requested to associate with them two practical farmers, not of the Board, and to examine the animals and award the premiums offered by the Society to be given for the best stock exhibited at Georgetown.

The Committee on Farms were authorized, if members could not conveniently give their personal attendance, to appoint as substitutes, gentlemen residing in the vicinity of the applicant, or a general agent to examine and report upon the situation of all the farms.

It was voted to pay to the Rev. Mr. Allen the sum of sixty

dollars, for his services in examining farms in behalf of the Committee.

The Board subscribed for the Journal of the Royal Agricultural Society in England.

This year the Society lost an able and efficient President, by the death of Hon. Thomas L. Winthrop. The following resolutions were passed on the occasion by the Board:—

"*Resolved*, That the Trustees of this Society deplore, with sincere and deep sorrow, the loss which the public at large, and they in an especial manner, have sustained by the death of their lamented President, the Hon. Thomas L. Winthrop, who has been an active member of this Board more than two-fifths of a century, and had presided over it nearly a third of that period, with a dignity and urbanity peculiar to himself.

"*Resolved*, That the surviving members of this Board, with a melancholy pleasure, bear testimony to the ability, fidelity and zeal, with which their deceased associate and President discharged all his official duties, to his devotedness to the interests of this Institution, his ever courteous deportment, and the harmonious and friendly intercourse that uninterruptedly subsisted between him and themselves, during a long intercourse of years.

"*Resolved*, That the deceased, though not a practical farmer, was in their estimation well acquainted with the details, as well as the principles and most improved system of husbandry, and was ever ready to contribute his personal services and pecuniary aid, to encourage useful experiments in farming, or in any way to promote improvement in agriculture, and that in him the farmers of Massachusetts have lost an enlightened and liberal patron."

The following premiums were paid this year:—

Joseph Wheeler, on farm, - - - - -	$ 75
Essex Agricultural Society, for premiums, - -	100
Middlesex do. do. do. - - -	200
Prouty & Mears, 1st premium for ploughs, - -	100
Charles Howard, 2d do. do. - - -	75
Abel Moore, 1st premium on Farm, - - -	200
Paoli Lathrop, 2d do. do. - - - -	175

R. Winchester,	well cultivated Farm,	- - -	75
W. Salisbury	do.	do. - - - -	75
R. Converse,	do.	do. - - - -	50
James Deane,	communication on mulberry trees,	- -	50

Vested funds of the Society at this time were $15,200.

A. D., 1841.

Hon. John Welles was chosen President, in the place of Mr. Winthrop, deceased. Hon. P. C. Brooks became First Vice-President, and Hon. William Prescott, Second Vice-President. Francis C. Lowell, Esq., and Hon. Levi Lincoln, were chosen Trustees.

The Committee on Orchards awarded the premium of fifty dollars, for the best orchard, to Mr. Randall, of New Bedford.

The Committee on Premiums were directed to consider the expediency of offering encouragement for experiments in the application of lime to the cultivation of grapes and vegetables, and for the general improvement of the soil.

Three hundred and seventy-nine dollars were paid to different county societies, to be awarded in premiums, besides the usual premiums on farms and crops.

A. D., 1842.

The only change in the Board this year was the election of John A. Lowell, Esq., in the place of Hon. Levi Lincoln, who declined a re-election.

It was voted that the proposed plan of Rev. Henry Colman, late Agricultural Commissioner of this State, to visit Europe for the purpose of acquiring practical information in agriculture and rural economy, and by imparting the same to the public to extend the knowledge of agricultural science in this country, is

cordially approved by this Board. The Treasurer was authorized to subscribe for one hundred copies of the proposed reports of Mr. Colman, and that the proportion to be paid in advance be paid by the Treasurer, in accordance with the terms of subscription.

Dr. Warren, Mr. Gray and Mr. F. C. Lowell, were made a Committee to report on the expediency of investing funds of the Society in an experimental farm.

The premium of one hundred dollars for the best dissertation on Manures, was awarded to Dr. Dana, and another of fifty dollars to Mr. Asahel Foote, of Williamstown. These essays were printed and widely distributed, at the expense of the Society.

Mr. Colman being about to sail for Europe, the Secretary was requested to send him a copy of the votes passed as before stated, and to express the continued interest of this Board in his intended mission, confiding in his zeal and industry, and that his thorough and ample reports of the state and progress of agriculture in Europe, would contribute much to its advancement in his own country, and commending his enterprise to the friends of agriculture, wherever he may meet with them.

Two hundred dollars were contributed to aid the shows in Hampshire, Hampden, and Franklin Counties, and in Plymouth County, besides the usual premiums on farms.

A. D., 1843.

The Officers and Trustees of last year were re-elected.

The President, Mr. Welles, stated in a letter to Mr. Brooks, his examination of the sycamore trees, in a recent journey he had made, with the hope that he had discovered an insect, which might be the cause of their present diseased appearance. This letter was communicated to Dr. T. W. Harris. For Dr. Harris' reply, see New England Farmer, for June, 1843.

Mr. Codman was appointed the Committee to award on the claims for the best arranged model of a Farm Account-Book.

One hundred dollars was paid to the Hampshire, Hampden, and Franklin Society, to aid their exhibition. An essay on manures, for gratuitous circulation, was printed, besides premiums and pecuniary aid in circulating agricultural information—in all, to the extent of twenty-three hundred dollars, no money having been received from the State this year. The vested funds of the Society had increased to seventeen thousand and five hundred dollars.

A. D., 1844.

Hon. Abbott Lawrence was chosen Second Vice-President, in the place of Mr. Prescott, resigned. Mr. John A. Lowell also resigned, and the two vacancies in the Board of Trustees were supplied by Hon. David Sears, and William P. Mason, Esq.

The Committee for the sale of the Brighton estate of the Society, which was this year sold at public auction, reported that the gross amount of the sales was $6,337.79. The Committee submitted the name of "Windship Place" for the estate, and it was adopted.

A premium of fifty dollars was awarded to C. Howard, of Hingham, for an improvement in the sub-soil plough.

Hon. William Prescott, one of the most efficient members of the Society, died this year.*

A letter was read, from Mr. J. Breck, requesting aid in the purchase of land and establishing an agricultural school at Westborough.

Dr. Warren was requested to make inquiries, with a view to carry into effect the suggestion of the Committee, appointed to consider the expediency of offering a premium for an essay on

* Descendant of Col. Prescott, of revolutionary fame, and father of William H. Prescott, Esq., the Historian. He was a distinguished lawyer, and universally beloved and esteemed for the purity of his life and the uprightness of his character. His farm was in Pepperell; he took great interest in rural affairs, and was a most laborious member of the Board, as his papers and minutes upon farms, stock, &c., abundantly testify.

the Diseases of Cattle, and also as to aiding in the expenses of a voyage to Europe of a medical student, to qualify himself to deliver lectures on the diseases of horses and cattle. Dr. Warren afterwards wrote on this subject to Dr. William Lawrence, then in Paris.

The Trustees concluded to omit the cattle show this year, and in lieu thereof, they voted to use the funds of the Society to an amount not exceeding two thousand dollars, for the importation of cattle of the Ayrshire and Devon breed, or any other that the Committee, or their agent, may think best, and in such a manner as the Committee may deem the most conducive to the interest of the public. One thousand dollars was, however given to aid the Worcester cattle show, besides other premiums.

A. D., 1845.

No change was made in the Board of Officers this year.

A letter, with a volume of Gen. Washington's agricultural letters, being a fac simile of his handwriting, was sent to the Society, with a suggestion that the work would be useful as premiums. The Treasurer was authorized to procure thirty copies, and that three copies be given to each of the county societies, and that one be presented to Edward Everett, Minister to the Court of St. James.

The Committee having charge of the imported stock, reported that four cows and a bull of the North Devon breed, and four cows and a bull, of the Ayrshire breed, had been purchased and brought in good order to this country, and for the present they were placed at Lexington with Mr. Phinney. These were obtained at a cost of about two thousand dollars, originally appropriated for the purpose.

Some months afterwards, Mr. Phinney reported that the herd in his care was doing well. He also read a statement in relation to them, and in regard to the average produce of cows in the Commonwealth.*

* Mr. Phinney made a monthly report upon this stock until the period of his death.

Dr. Warren (of the Committee on the Diseases of Animals,) made a verbal report, that he had received an answer from Dr. Lawrence, whose early return to America would prevent his compliance with the wishes of the Board, and he recommended the purchase of an anatomical representation of the horse, which was capable of being taken apart.

Dr. Warren afterwards read a letter from Dr. Edward Brooks, who was willing and desirous to qualify himself to deliver a course of lectures, on his return from Paris; and the Committee were authorized to propose such arrangements to Dr. Brooks, as to induce him, in the study of his profession in Paris, to have reference to this particular branch, with a view to delivering lectures on this subject, after his return.

A. D., 1846.

Hon. John C. Gray was elected President in the place of Hon. John Welles, resigned. Elias Phinney, Esq., was chosen Recording Secretary. Hon. Daniel Webster was chosen First Vice-President in the place of Hon. P. C. Brooks. The two vacancies in the Board of Trustees, were supplied by Hon. Daniel P. King of Danvers, and Thomas Motley, Esq. The latter having declined, Hon. Martin Brimmer was chosen by the Trustees.

A Committee was appointed to select and purchase six cows of the best qualities, to cross with the imported stock; and for this purpose an appropriation of five hundred dollars was made. Three cows were purchased at the respective prices of $65, $70, and $100, and at the sale of Mr. Randall's Ayrshire stock, at New Bedford, two others were purchased, Gowan and Swinley, and added to the herd.

A copy of the "Farmer's Dictionary," was sent to the Society by Messrs. Harper & Brothers, to be given to the person who should gain the first premium on corn.

Mr. Gray presented an ear of Oregon Corn, containing twenty-one rows.

A letter was received from P. Lund Simmons, Editor of the Colonial Magazine, respecting a species of grass called Angola grass, and a Committee was appointed to obtain some of the seed for experiment.

A letter was received from Mr. Bosson, proposing to establish an Agricultural Museum.

Dr. Warren, at the invitation of the Legislative Agricultural Society, delivered a lecture upon the horse, explained its structure, and illustrated it by a dissection of the imported artificial skeleton of the horse.*

The publication of "An Abstract of the Returns of the Agricultural Societies in Massachusetts," by the Secretary of State, under the act of 1845, was commenced. The abstract was prepared by Allen W. Dodge, Esq., the present able and indefatigable Secretary of the Essex Agricultural Society. The report of this Society was inserted entire, as follows:

The undersigned, as Recording Secretary of the Massachusetts Society for promoting Agriculture, in compliance with the requisitions transmitted to him by the Secretary of the Commonwealth, respectfully reports;

That, at the monthly meeting of the Board of Trustees of the Society, held in January last, the Committee on Premiums made a report, offering premiums as heretofore on various modes of culture, on stock, on inventions, on farms, and a premium for the best essay on diseases of animals, which report was accepted. The offer of a premium for the best essay on the diseases of animals was subsequently modified.

The subject being discussed, it appeared that this department of medical science had been little regarded in this Commonwealth; that if an animal became sick, or was wounded, regular practitioners were not usually summoned, and the farmer had to depend upon any one in his neighborhood who had acquired a reputation, by some little experience, for skill in cases of diseased animals. It was therefore voted, that Dr. Warren, one of the board of trustees, be authorized to offer pecuniary aid to any student of medicine (whom he thought qualified for the purpose) to assist him in completing his education abroad, upon the condition that he should give a portion of his time and particular attention to the Veterinary establishments, for the re-

* Dr. Warren was a very active and influential member of the Board for many years, and he took a lively interest in everything connected with the animal department. The "skeleton" of the horse was imported by the Society at his suggestion, at a cost of one thousand dollars. It is now placed in the Agricultural Rooms in the State House.

lief and recovery of wounded or diseased animals, in Europe, and especially in France; that he should attend the lectures of the most eminent surgeons on these subjects, to qualify himself to deliver lectures, as well as to practise in this department of science, on his return.

The vote accepting the report of the committee on premiums having been re-considered, a full discussion ensued, and the board came to the conclusion, that the distribution of their funds in premiums as heretofore offered and awarded, (viz., on stock, imported or native, on various modes and objects of agriculture, on the greatest quantity of produce on an acre, on the produce of the dairy, on implements and inventions, on orchards, hedges and forest trees, on the culture of the mulberry and the manufacture of silk, on the culture of the beet and the manufacture from it of sugar, for the best essays on given subjects, for the mode of destroying, if any there were, the insects destructive to vegetables and to trees and to bees, for the best managed farms, and various other objects of great importance to farmers,) had for the time produced the desired effect. It had stimulated the working men of the Commonwealth to effort and investigation, and had done great service by inducing careful experiments and accurate noting of the time, manner and circumstances in which the experiments had been made, thereby giving exact and absolute knowledge whether the experiment proved successful or not.

The board were therefore of the opinion that an intermission of their usual offers, for a time, would be beneficial, and they hoped to excite a new interest in rearing stock, by an importation of the best breeds of milking animals, as well as combining strength and aptitude to fat, that could be obtained, and holding them until they had so multiplied that their stock might spread over the State, at a small expense, compared with the expense of importation, and, therefore, in May last, they voted to appropriate their funds to the importation of stock.

It was assumed, as a fact well established, that care, skill and judgment in raising animals remarkable for their size, strength, docility, and, if cows, for the quantity or quality of milk, would insure in certain breeds, an excellence in either quality at least equal to the parent stock; and, if one of superior excellence should appear, that this superiority might be preserved in the descendants. This theory had been long tested in Europe, where bulls remarkable for the character of their stock become exceedingly valuable, whereas it was rare in this Commonwealth for farmers to keep bulls long enough to know the character of their stock as milkers. With the hope, therefore, of encouraging more attention to the breeding of stock, and to introduce the breeds now most highly prized in Great Britain, the board of trustees voted that an agent be selected and supplied with funds, to go to Europe and purchase animals of the highest character for purity of blood in the breeds of Ayrshire in Scotland, and of North Devon in England, and if he should meet with any other breed of high esteem as an *improved* breed, to select and bring home a pair, in order to test their qualities in this country.

That, so authorized, an agent did proceed to Europe, and in Octo-

ber last returned, and brought with him, in health and fine condition, four cows and a young bull of the Ayrshire breed, and four cows and a young bull of the North Devon breed, at a cost of $2,582 02; that their agent was fortunate in procuring, at fair prices, animals of the highest character for productiveness, and the trustees have the fullest confidence that in this importation they shall most effectually promote the substantial interests of the farmers of Massachusetts.

The undersigned further respectfully reports, that the said stock are for the present at the farm of Mr. Phinney, one of the board of trustees, and that it would be a great pleasure to him and to the board, to have the animals, their pedigree, and the report of the agent who selected them, examined by any gentleman interested in the improvement of stock.

All which is respectfully submitted by

BENJ. GUILD,

Rec. Sec'y of the Mass. Society for Promoting Agriculture.

December 13, 1845.

A part of the report of Mr. Phinney in relation to this stock, which has now taken deep hold in Massachusetts, is as follows:

The distribution of the descendants of the imported stock, in a way that would be most likely to carry out the original intention of the Society, by allowing the whole of the Commonwealth to share in its advantages, had for some time engaged the deliberate consideration of the trustees. To effect this desirable object, and to place within the reach of every farmer the opportunity of improving his stock of cattle with as little inconvenience, and at as low a charge, as possible, has been the earnest desire of the trustees; knowing the reluctance with which most farmers part with their hard earnings for what even they may be made to acknowledge may be a positive good, and much more when the object to be attained is of future, and in the smallest degree of doubtful utility, the trustees were desirous of removing as far as possible every obstacle on the score of expense.

With these objects in view, the trustees, at their meeting in October last, decided to make a gratuitous offer of all the offspring of the Society's stock of cattle to the several County Agricultural Societies, according to the dates of their respective acts of incorporation, by placing in the hands of the officers of the respective County Societies, one or more of the animals, when at a suitable age, for the use of the counties in which they may be respectively located. By the annexed circular, it will appear that the trustees reserve the right of retaining as many of the offspring as may be necessary to keep up the number of the original purchase, and also of reclaiming any one or more of them that may be considered necessary to supply the loss of any one or more of that original number, or for any other desirable purpose. Hoping that each of the County Societies would lend a cheerful co-operation with the State Society, in every measure that might

tend to promote the interest, and best subserve the good of the whole, the trustees believed there would be no objection on the part of the County Societies, to receiving the animals with this reservation.

The whole number of full-blooded animals owned by the State Society, including the original purchase and their descendants, is now twenty-five. To this number, nine more, it is expected, will be added in the course of a few months. These, with their descendants, it is believed, will, within three years from this time, enable the trustees to place in the hands of each of the County Societies at least half a dozen of the full-blood animals, equal to any that can be found in this or any other country. The result of this liberal distribution of the best stock among the farmers of Massachusetts, aided by the skill and careful management of the County Societies, by increasing the product of the dairy, and the value of farm stock generally, will, it is believed, be of almost incalculable benefit.

Some evidence of the value of the Ayrshire, as a dairy stock, and the estimation in which they are held by farmers, may be gathered from the importations of that breed in years past. In 1836, the State Society imported three cows and a bull of this breed. One of the cows was placed in the care of the subscriber. When twelve years old, in the month of January, four months after calving, she yielded ten pounds of butter per week, when kept on hay and one peck of carrots per day. The calves of either sex, at a year old, found a ready sale at $100 each. A half-blood, at four years old, produced by a cross of the Ayrshire bull with a good native cow, yielded twenty-one quarts of milk per day, for some weeks after calving. The price at which half-blood cows of three and four years old have been sold, has been from forty to sixty dollars, while the native breeds of the same age were selling for from twenty to forty dollars. In some instances, the owners of heifer calves of the half-blood, at only four weeks old, have refused to part with them for an offer of twenty dollars.

The Ayrshire cow, "Young Swinley," imported about seven years since by Capt. Randall, as before stated, and now owned by the society, furnishes an instance of what may be done with a single cow, by way of improving the stock of the country. This cow, upon common keeping, yielded fifteen pounds of butter per week. Four of her descendants are known by the subscriber; "Maggie," owned by the President of this society; "Effy," owned by Mr. Wright, of Lowell; "Pink," owned by Mr. Lawson, of Dracut; and "Gowen," owned by the State Society. These are all first-rate cows, and give promise of being fully equal to the dam, and have given from one to four calves each. In a few years the trustees hope to be able to give as good an account of the produce of each of their imported cows. In addition to the four cows above stated, the descendants of "Young Swinley," she has given birth to two or three valuable bull-calves, the youngest of which is owned by the society, and she is now in calf again by the society's Ayrshire bull "Prince Albert."

I would now ask the advocates of our native stock, to the utter exclusion of all foreign breeds, where among all the celebrated milkers of native breed, they can point to a cow whose offspring will compare

with that of "Young Swinley?" What has become of the famous "Oakes Cow," the "Nourse Cow," and a host of other *accidental* good cows, descended from a medley of all races,—unsurpassed, it is acknowledged, in their yield of milk or butter by any of the imported cows? But where are they? All found their way to the shambles. What has become of their descendants? All gone the same way; not a solitary one of them found to be worth the expense of rearing.

Thousands of dollars have been paid within this Commonwealth for the express object of improving the dairy stock; and what has been the result? The hoped-for improvement has been looked for in vain. Not an instance is on record where the extraordinary qualities of the dam have been transmitted to the progeny, except by the crossing with some pure blood of a foreign breed.

Should the opposers of the introduction of the foreign breeds of animals reason philosophically upon the subject, and base their conclusions upon the immutable laws of animal physiology, they would readily understand why their native cow, in whose blood there are blended many of different races of good and bad qualities, might, and in all probability would, produce a worthless calf. They might also, by this mode of reasoning, be induced no longer to question the expediency of expending a few thousand dollars, in procuring a *certain means* of improving the stock of the whole Commonwealth.

And now, while the Massachusetts Society are thus endeavoring to furnish the farmer with the means of improving the quality and enhancing the value of his stock, they take the liberty of reminding him of the duty that devolves upon him, of doing all in his power to aid in the promotion of this desirable object. The cleanliness, comfort and well-being of his cow, furnished by a kind Providence to be the friend and nurse of the whole civilized family of man,—the cow, which contributes so much to the necessities of the poor and the luxuries of the rich,—should be the object of the farmer's unremitted care and solicitude.

Respectfully submitted by

E. PHINNEY.

A. D., 1847.

There was no change in the Board this year, except that in the place of Mr. Forbes, who declined, G. W. Lyman, Esq. was elected Trustee, to supply the place of Hon. Martin Brimmer.

A letter from the Royal Agricultural Society of Paris was received, requesting the result of the Society's inquiries in relation to the potato disease. Dr. Warren, Mr. Codman, and

Mr. King, were made a Committee to report an answer to these queries. At a subsequent meeting, Dr. Warren made a report, which was a communication of Mr. Teschmacher, stating the results of his experiments to ascertain the cause, and if possible a remedy, for the disease of the potato. Mr. Teschmacher had just been chosen a member of the Society, and it was voted that his communication be sent by the Society, officially, as the result of the investigations of one of its members, and that Mr. King, one of the Committee, be requested to transmit with this report, the last report of the Patent Office, and such other publications or documents, as he may think pertinent to the inquiries made by the Royal Agricultural Society.

A letter from Andrew E. Belknap was received, in which he offered to the Trustees a bag of Lentils (a species of pulse) a plant little known or cultivated in this vicinity.

It was voted to distribute the offspring of the imported stock among the County Societies, on the condition that, whenever in the opinion of this Board, the interest to be subserved by this distribution would be more effectually promoted by the return of the animal to this Society, either to supply losses or for any other sufficient cause, the said animal should be subject to the Trustees, and be returned to them.

A letter was read from Mr. Buckingham, enclosing one from Professor Horsford, in which he requested pecuniary aid to investigate the cause and discover the cure of the disease of the potato.

The expense attending the importation, care and distribution of the stock of cattle belonging to the Society, exhausted the year's income for this and the two following years, when they were finally disposed of.

A. D., 1848.

The Officers and Trustees of the last year were re-elected.

Mr. Phinney was authorized to sell the purchased native cows in his care belonging to the Society, and also their male calves, and that the calves be sold, on the condition that they be not taken out of the Commonwealth.

The books of the Society, in the hands of the Secretary, were removed this year to the Athenæum.

No business of an extraordinary character seems to have been transacted this year. The principal subjects of attention being the care and disposition of the imported stock, and correspondence with other Societies and individuals upon matters connected with the advancement of agriculture.

A. D., 1849.

No change took place in the election of Officers this year, until the death of Mr. Phinney, the Recording Secretary. Soon after, upon the resignation of Mr. Lawrence, Charles G. Loring, Esq., of Boston, was elected a Trustee, in his place. Mr. Sears also resigned.

Dr. Warren stated that Dr. Edward Brooks had returned from Paris, and proposed to deliver, in compliance with the wishes of the Trustees, a course of four lectures on the diseases of animals, during the month of February. It was voted that they be delivered in the Hall of the Representatives.

The stock belonging to the Society was sold, on the following conditions, that the whole of one species be kept together, that the whole of the Ayrshire Stock be sold to one individual, and the whole of the Devonshire to one, or as many of one kind as it may be practicable to dispose of in this way; and that the sale of all the stock be conducted on the condition that the animals be retained in the State; also that the whole of one kind

be restricted to one county, for the sake of keeping all of a kind together.*

Application was made to the President to join with other Agricultural Societies, in requesting the aid of the Legislature in promoting Agricultural Education. This application was seconded by the Society.

A. D., 1850.

Dr. J. C. Warren was chosen one of the Vice-Presidents, in the place of Hon. Abbott Lawrence, who had resigned. Francis C. Lowell, Esq., was chosen Recording Secretary. The vacancies in the Board of Trustees were filled by Hon. Edward Everett and Thomas Motley, jr., Esq.

A pair of cattle, of the North Devon breed, were selected and presented to George Denny, Esq., of Westborough, for the use of the State Reform School, as a token of the sense entertained by the Trustees of the liberality constantly manifested by the Commonwealth to this Society.

Hon. R. C. Winthrop and Samuel Lawrence, Esq., were chosen Trustees, to supply the vacancies occasioned by the death of Mr. King, and the resignation of Mr. Codman, Treasurer. Thomas Motley, jr., was elected Treasurer.

An appropriation of twelve hundred dollars was made for the importation of a bull and five cows, of the Alderney breed; this sum was afterwards raised to $2500.

Dr. Warren made some statements of the great superiority of the white corn of Rhode Island to any other corn for bread, and advocated its general culture.

* The greater part of the Ayrshire Stock was purchased by G. W. Lyman, Esq., who now has a full herd of pure blood animals, derived from the purchase.

A. D., 1851.

The last year's Officers were all re-elected.

A Committee was appointed to examine the utility and the practicability of a certain process, discovered by Mr. D. T. Curtis, for the early ripening and the long continuation in perfection of ripened fruits.

Dr. Brooks, who had been employed by the Society to acquaint himself with the diseases of animals, and to lecture on this subject, was suddenly attacked with a disease that proved fatal. Arrangements were subsequently made with another young physician (Dr. Slade) to carry out the same views.

A letter from W. T. A. Bradford was read, accompanying a pamphlet which he had written upon the origin of the potato, and upon the disease that effects it, offering the pamphlet for ten dollars per hundred. The Trustees purchased two hundred of the pamphlets; but in writing to Mr. Bradford, the Secretary suggested that the vote was passed, before the treatise had been read, more with a view to reward and to stimulate investigation, than to sanction anything that might be advanced.

A. D., 1852.

The Officers of the past year were re-elected.

A letter from the Secretary of the Commonwealth was read, dated June 11th, in reference to an act of the Legislature, of April 21, wherein it was required of all societies receiving annual grants from the State "to appoint a member of the State Board of Agriculture," within sixty days of the passage of the act. It was therefore voted that the President, Mr. Gray, be appointed a member of the State Board of Agriculture.

Dr. Warren, Mr. Everett, and Mr. Winthrop, were appointed Delegates to the National Agricultural Convention.

Mr. Motley was authorized to obtain a new plate for Diplomas, to supply the place of the one which was lost.

The Board experienced this year a great misfortune, in the death of Hon. Daniel Webster, who was "as remarkable for his comprehensive views of the general principles, and his thorough acquaintance with the practical details of agriculture, as for the depth and soundness of his legal and political knowledge."

Another effort was made to obtain the grant of the remaining half township of land from the State of Maine which had not yet been placed in the Society's possession.

Dr. Warren resigned his office as Vice-President, at the end of the year.

A. D., 1853.

Several vacancies occurred in the Board this year, and Dr. Warren, Henry Codman, and Josiah Quincy, jr., declined re-election. The new Board was constituted as follows:

J. C. Gray, *President.*
F. C. Lowell, *First Vice-President.*
William P. Mason, *Second Vice-President.*
Charles G. Loring, *Corresponding Secretary.*
G. W. Lyman, *Recording Secretary.*
Benj. Guild, *Assistant Recording Secretary.*
Thomas Motley, jr., *Treasurer.*
Edward Everett,
R. C. Winthrop,
Samuel Lawrence,
James Brown,
George Peabody,
James W. Paige,
} *Trustees.*

The Treasurer was authorized to pay to the Treasurer of the Board of Managers of the National Exhibition of Horses, the sum of two hundred and fifty dollars, for distribution in premiums in aid of their objects as solicited.

One of the Alderney Cows, fed upon grass and corn-stalks gave milk yielding an average of 12 lbs. 3 oz. of butter a week for seven months, under the charge of Mr. Motley.

A letter was received from Col. Chandler, President of the Middlesex County Agricultural Society, suggesting the expediency of districting the Commonwealth into four districts for the purpose of offering premiums of seventy-five, fifty and twenty-five dollars in each district in successive years, for the best dairy stock of not less than six, and that the premiums be paid by the Trustees of this Society. An appropriation was afterwards made for this object.

The sum of one hundred dollars was given to aid the Legislative Agricultural Society in obtaining lecturers.

Mr. Everett resigned his seat in the Board.

Six hundred dollars were paid to Dr. Slade for his lectures in the State House, on the Horse, and two hundred and fifty dollars to the National Horse Exhibition.

A. D., 1854.

No change was made in the Board this year, Mr. Everett having remained in the Board, by particular request.

A communication from the Worcester Agricultural Society, suggested the offer of a premium for an experiment of five cows of different breeds, and all fed and treated alike.

A conversation was held with Mr. Newton, of Berkshire, who wished the attention of the Trustees called to a supposed discovery of the cause of the potato disease.

A vacancy occurred in the Board this year, by the death of James Brown, Esq., a gentleman distinguished for his integrity, liberality, his practical good sense, and the amenity of his disposition and manners.

A legacy was bequeathed to the Society this year by the late Dr. George C. Shattuck.* One hundred and fifty dollars were contributed to the Berkshire and the same amount to the Wor-

* It has been accumulating by the will of the donor, until the present time, and now amounts to the sum of nine thousand one hundred and sixty-six dollars.

cester Agricultural Society, to be expended in premiums. One hundred dollars in purchase of a Jersey bull presented to the State Reform School, at Westborough, and one hundred dollars in the importation of turnip seed for distribution.

A. D., 1855.

The vacancies in the Board, occasioned by the death of Mr. Brown, and the resignation of Messrs. Everett and F. C. Lowell, were filled by the election of Messrs. Stephen Salisbury, Wm. S. Lincoln, and R. S. Fay.

The sum of six hundred dollars was appropriated for a premium, or premiums to encourage the introduction and use of mowing machines.

One thousand dollars was given in aid of the United States Agricultural Society's show, in Boston, two hundred and fifty-nine dollars to county societies, for special premiums, which, with the expenses on account of stock, and other gratuities of about eight hundred dollars, exhausted the annual income of the society.

The premium offered for mowing with a machine excited a general competition throughout the State, and gave a great impulse to their introduction and use, as well as to the improvement in the manufacture of them. The following report upon the subject was made by a Committee of the Trustees, in whose hands it was placed.

The undersigned, being a committee appointed by the Society to take charge of the subject of a premium of six hundred dollars, offered by the Society "to the possessor of the mowing machine which shall cut, during the present season, with the greatest economy and to the best advantage, not less than fifty acres of grass within the State, the machine to be worked by horse or ox-power," beg leave to report:—

Immediately upon their appointment, they issued a printed circular, offering the premium with the conditions attached to it by the Trustees. They likewise invited the County Agricultural Societies to assist them in their duties by observing the work performed by the

competitors within their districts. They also prepared a blank form which was sent to each competitor, with a view of obtaining a uniform return upon all the points deemed to be necessary in making up their award, and also such information as might prove useful hereafter, both to farmers and to the manufacturers of machines; copies of each of these documents are herewith appended.

Forty entries were made for competition within the time limited by the trustees; of these, but sixteen complied with the conditions by making a return of their work before the tenth of September. Of these, Mr. Lyman desired not to be considered a competitor, making his return only for the purpose of adding to the general information sought for by the trustees upon this subject. The return of the Hon. Josiah Quincy came too late to entitle him to claim the premium; but it is recorded with the rest as a valuable addition to the knowledge sought for by the committee, as also his remarks, a portion of which will be found in the Appendix.

It was originally proposed that the labor of supervising the work of the competitors should be divided among the members of the committee. It was soon apparent, however, that this method would not give them that knowledge of the comparative merits of the competitors, which was absolutely necessary in the final award of the premium. It was therefore arranged that one member should visit each competitor and examine his work, thus creating one general standard by which the whole should be judged. Mr. Lincoln undertook this extremely laborious task, and the report of his observations is herewith submitted for your examination.

Much good, although some misapprehension, has arisen from County Societies having appointed public trials of mowing machines, connecting them with this premium offered by the trustees of this Society. This has been caused, in part, by the fact of the premium offered for the *best mowing machine* to be awarded in 1856, and partly from the great interest which has sprung up among the farmers in relation to the subject. These trials, although interesting and instructive in themselves, have had no weight or influence in making up their award. The committee have directed their attention singly to the work done, and to the skill and economy with which it has been accomplished. They are fortunately relieved from passing any judgment upon the comparative merits of any particular patent or the work of any manufacturer at this time, because they have seen no machine as yet, which, in their opinion, is not capable of very great improvement; and they feel confident that by the coming year, we shall see many modifications which will add to the efficiency of the instrument, and (the committee hope) much better workmanship than has thus far been exhibited by the makers. The field is still open for the patentees and manufacturers, and every effort will be made that a fair trial shall be had to determine whose machine is the best, as there has been this year, to determine who has shown the greatest skill in the management of those now in use.

The returns of the competitors, (an abstract of which is herewith appended,) furnish much useful information. They establish conclusively, that machines can be used to mow with advantage a much

larger range of field, as to quality and condition of land and grass, than one would have supposed to be possible at this early stage of their introduction. Rough land covered with stones, hilly and broken surfaces, reclaimed bogs, salt marsh, all seem to have been brought under the dominion of the machine, with as few casualties to it as usually fall to the common scythe. At the same time the returns show with equal clearness that the farmer will gain in the end, by putting his field into better condition for the use of the machine; and it is to be hoped that one consequence of their introduction will be clearer and better ordered fields, and the removal of stumps and stones that have been too long an eye-sore and a disgrace to many of our farms.

The returns in detail show how minute the sub-division of our farms has become from the smallness of the fields cut over, not averaging, with the exception of the river bottoms, four acres. These small fields are great impediments to good farming in every point of view, and particularly to the use of machinery moved by oxen or horses. It would not be too much to say that one field of twenty-five acres can be more cheaply and better cultivated, and with a better pecuniary result per acre to the farmer, than twenty acres cut up into three, four or five lots.

The time employed in cutting with the machine is of considerable importance in reference to its labor-saving properties; and if we were confined to the returns themselves, it would be impossible to decide how far this economy has been carried. Some of the competitors have doubtless deducted for all stoppages; that is to say, they have made an exact return of the time during which the machine was actually in motion, while others have counted from the time when they commenced work to the moment when they finished, without deducting for stoppages to rest and repair. Nearly all the competitors, however, have cut a measured half acre before Mr. Lincoln; the average of the time being about twenty-two minutes to the half acre. The land selected for these trials was equal, if not better, than the average, and the horses were driven as fast, at least, as they were accustomed to be worked. This would therefore prove, that a fair average performance of a machine would be for cutting one acre, forty-four minutes; whether a pair of horses could continue this rate of work for any great length of time is not so certain; but the facts before us and our own observations lead us to believe that an hour per acre would not be an overtask for horses, including all ordinary stops, and that a pair of horses could continue the work so as to cut, without undue exertion, from ten to twelve acres per day.

The time table as presented by the competitors, is evidence of the value which they attach to speed, and too much haste has in consequence shown itself in the work performed. The machine has, in too many instances, been dragged over without cutting the grass, for want of time to permit the knives to operate, and a mane of grass has been left between the swarths in the endeavor to get the full benefit of the cutting bar. The competitors have nearly all erred in these respects; but the fields of Mr. Lyman, which, since he has withdrawn from the competition, we feel no hesitation in speaking of,

present a complete exception, affording a beautiful illustration of even and correct speed, and evincing no common judgment and skill in the operator of the machine. We allude to this for another reason, from the fact that the operator had never before worked or seen a machine at work; the important truth is established, that it requires no apprenticeship to work a mowing machine, but that it is at once a useful instrument in the hands of any one possessing a fair amount of judgment and discretion.

The returns are uniform in their testimony as to the ease with which the horses have performed their work. They have been generally of light weight, not averaging more than 1,050 pounds, and they have gained in flesh during the season's work, several of the competitors cutting from sixty to ninety acres, and doing all the raking, carting, and other usual farm work.

The accidents which have been recorded by the competitors have been much fewer and slighter in character than it would have been thought possible in fields not properly prepared for the machine, and they have generally been repaired upon the spot, and they have too often been the result of imperfect workmanship. A nut should never get unscrewed or a finger, pin, or pole break, unless some great violence is done to the machine by the unskilfulness of the operator. Yet all these accidents have occurred without any apparent good reason, in too many cases. The remarks of the competitors upon this point are well worthy the attention of the makers of mowing machines.

There is another gratifying fact which has come under the observation of the committee, and which they deem worthy of mention, and it is this, that the better and stouter the grass, the more perfect has been the working of the machine, in all respects. This is another inducement to better cultivation, which, it is to be hoped, will not be lost upon farmers.

We come now to the delicate and difficult question, to which competitor or competitors shall the prize be awarded? In order to arrive at a conclusion, satisfactory to ourselves, we have made an abstract of the returns, and have given to each competitor credit for what he has done, taking time, quantity, quality, and economy of work into each account. We have also had the benefit of Mr. Lincoln's report upon the performances of each competitor, and have deduced from it, as well as we could, the comparative excellence of the work done. We have also been aided by the reports and the observations of county societies and committees. It will be borne in mind that the trustees, in offering the prize, reserved to themselves "the right of dividing it among equal claimants." This, fortunately, relieves the committee from a very great embarrassment; for it is impossible for them to determine which, of two competitors, stands the first. All other things being equal, the highest number of acres cut would have settled the question, but this is not the case, no two things being equal—each having a superiority, in some points, over the others. They recommend, therefore, that the premium of six hundred dollars be divided, in equal sums, and paid to the following competitors: MARCUS BARRETT, of Auburn; SAMUEL PARSONS & SONS, of Northampton.

Accompanying the returns, there have been several letters and communications addressed to the committee, by competitors and others, portions of which are annexed to this report, as bearing upon points about which it was the design of the trustees to procure information.

The committee have received the ready and cheerful co-operation of the county societies, whose services have been rendered in a most liberal spirit. They have likewise been met by the competitors in the best feeling, and with an earnest desire, on their part, to do all in their power, not so much to gain the premium offered, as to test the value of the mowing machine as a labor-saving implement. They cannot, therefore, take leave of the subject without an expression of thanks to all who have been engaged in the competition, and to those who have assisted them in their labors.

General abstract of the returns of the competitors.

Number of competitors,	17
do. acres cut,	1,457
Hours occupied in cutting,	1,067
Average time per acre in cutting, minutes,	44
Number of horses employed,	34
Average weight, lbs.	1,029
Fingers broken or lost,	93
Knives,	18
Pins, screws, bolts,	17
One track clearer broken,	1
" pole,	1
" axle,	1
" iron brace,	1
" crank,	1
" cog wheel,	1

A. D., 1856.

Hon. George T. Bigelow was elected a Trustee, in place of W. P. Mason, Esq., resigned.

Encouraged by the interest excited last year in relation to mowing machines, the Trustees offered a premium of one thousand dollars for the best machine, to be competed for during this year. The introductory remarks in the Transactions, as well as the Report of the Committee, not being Trustees, who were selected to award the premium, will be given hereafter.

The Society also held a dairy show at Worcester, in connec-

tion with the annual show of the Worcester Agricultural Society, appropriating twenty-five hundred dollars in premiums, and likewise exhibiting and afterwards disposing of the Jersey Stock, owned by the Society, at auction. The show was a very creditable one, *as far as it went*, but the Trustees were generally disappointed at finding that, after all the expense and labor which it had cost the Society, so little State feeling could be roused upon a subject of such paramount importance to the interest of agriculture. It was remarked by one of the Trustees at the dinner, after the show, "that good animals and good farms went together, and he was sorry to see so few evidences of the latter at the show. A farmer cannot bring his thrifty acres to Worcester, to exhibit them, but he might bring the title deeds of them, in the form of well-fed stock."

A very able report on Classes Nos. 1 and 2, in the Dairy Stock Premiums, was prepared by the Hon. Levi Lincoln, in which great regret was expressed that there was not a larger and wider competition for the premiums offered.

"It is now," says the Report, "more than a year since the Trustees of the State Society, with munificent liberality, appropriated a sum exceeding two thousand dollars, for the encouragement of dairy stock, of which sum one thousand and fifty dollars were offered, in published proposals of premiums, for dairy cows, in two classes of six and four animals respectively, to be exhibited at the annual cattle show of the Worcester County Society, the present year. The competition was made open to farmers from all parts of the State; and to equalize localities, as far as might be, liberal compensation for travel was provided for competitors, in proportion to their distances from the show. Four premiums were proposed in each class, varying in the first class, from $250, the highest, to $100, which was the lowest; and in the second class, from $150 to $40. It might have been expected that an amount of bounty so nearly corresponding with the value of the animals to be exhibited, and so richly remunerative of any care and labor in giving an account of their qualities, and their management and product for a single season, to say nothing of the incentives and influences of a public spirit, would have secured general attention, and attracted

numerous competitors in the trial. The committee have to regret that such has not been the case. There are even fewer competitors than the number of premiums offered for distribution; and of these, with a single exception, all are from the county of Worcester. After the repeated efforts which, in years past, have been ineffectually made to obtain, by statement and exhibition, the means of comparison and preference between the dairy stock of different districts of the Commonwealth, and to gather reliable information of the product of dairies and the mode of their management, there is little to encourage a persistence in this mode of inquiry. But we may be comforted in the assurance, that the progress of improvement, though slow, will be certain to follow individual interest and enterprise, and trust to time, at last, for the fruits of experience and success,"

The "Transactions," for 1856, were almost entirely devoted to the subject of Dairy Stock, and the first No. of an article by T. Horsfall, from the Royal Agricultural Society's Journal, (England,) was added. It will be found worthy the attention of every farmer in Massachusetts. Two thousand copies were printed, by order of the Trustees, for gratuitous distribution, a number having been sent to each Agricultural Society in the State, and a portion left with C. L. Flint, Esq., the Secretary of the Board of Agriculture, to be similarly disposed of.

EXTRACTS FROM THE TRANSACTIONS OF 1856.

Introductory Remarks.

The operations of the Society during the present year have been of more than usual interest. This has been occasioned by the dairy show, which took place at Worcester, under the auspices of the Worcester Agricultural Society, in connection with their usual exhibition, and by the trial of mowing machines entered in competition for the premium of one thousand dollars.

By referring to the records of the Society it will be found that from the earliest period of its existence much attention has been paid to the improvement of the breed of cattle, and more particularly with reference to dairy purposes. Importations of stock have been made from time to time at very considerable expense, and the animals have been placed in a way to disseminate their breed throughout the State. In this manner the Devon, Ayrshire and Jersey cattle have been successfully introduced. Without increased attention, however, to the keeping of stock, and more care in selection for breeding purposes, the simple act of bringing good animals into the country will do but

little good. It has consequently been the aim of the Society by the offer of liberal premiums, to advance the improvement of the stock thus introduced, as well as to excite a more general interest in this subject.

By an arrangement made with the Worcester Agricultural Society, one day of their show was devoted to the exhibition of the dairy stock, for which premiums were offered by this Society, although the competition was not as general as could have been desired, falling far short of the expectations of the Trustees, it has, nevertheless, been of service in awakening attention to this important branch of agricultural economy. One reason for the smallness of the numbers competing for the various premiums offered may be found in the difficulty of forwarding cattle to any distance, and the injury occasioned to dairy stock by a change of food and from exposure during the exhibition. In view of this, the Trustees would suggest that hereafter, in all cases of premiums for dairy stock, the Committees to whom the awards are confided, should visit each competing animal, examine the mode of treatment and the management of the dairy at the home of the competitor, and make the awards before the day of exhibition, requiring only successful competitors to send their animals to the show.

The Jersey cows belonging to the Society were exhibited at Worcester, and at the conclusion of the show all the animals were offered at public auction and sold without reserve. This herd has been in the possession of the Society for five years, and by an arrangement with Thomas Motley, jr., the male progeny has been from the first his property, and all the bull calves have been raised and sold for breeders. The sale of the cows and heifers has now been made, and an opportunity afforded to the farmers of the State to possess one or more of them.

The thanks of the Trustees are most cordially given to the Worcester Agricultural Society for the ready aid and co-operation of its worthy President, Mr. John Brooks, and the other officers of the Society, upon this interesting occasion, and also to the Committees, who cheerfully gave much time and attention in making their awards. Nor will it be thought invidious or unjust, if, from the number of those who thus aided the Society, the Trustees should name in an especial manner the services of Ex-Governor Lincoln. His labors, as well as his distinguished knowledge upon the subject committed to him, sufficiently appear in his able and interesting report on the two first classes of premiums offered; it needs no word of praise to commend it to the attention of all farmers in Massachusetts. But the Trustees feel it to be a pleasure as well as a duty to speak of one so long and so honorably distinguished in the public service, who in the retirement of private life still occupies himself so usefully and beneficially for his fellow men. Indeed, without his aid, this effort to collect and embody useful information and to excite emulation where both are so greatly needed, would have lost much of the good which it is hoped has been effected.

Not less interesting in the transactions of the Society for the present year, and of special importance also, to the agricultural commu-

nity, has been the competition for the premium on mowing machines. Every step made to save manual labor by the use of machinery in tilling the soil, and in bringing agriculture as nearly as possible under the control of labor-saving implements, is in the right direction. The principle means of accomplishing the economy of human labor in agriculture, as in other departments of industry, are the exercise of skill and the employment of machinery, both of which indicate a high state of advancement, and may be regarded as a true test of its progress.* There are two principal points, therefore, in relation to this subject, to which attention ought to be directed; one is, the introduction of agricultural implements, in all cases where their profitable use can be satisfactorily ascertained; the other is, that these implements be manufactured at as low a cost as possible consistent with perfect workmanship. It follows, of course, that the more general the use of any instrument is, the cheaper it can be afforded; but it is also true that, for want of skill and care in their manufacture, farmers often suffer much inconvenience, and are discouraged from purchasing and using many implements for farm work, of a really useful and labor-saving character.

Last year the Trustees offered a premium of six hundred dollars, to the person who should cut not less than fifty acres of grass by a machine moved by horse or ox power. The object which the Trustees had in view, was, principally, to bring out skill in the use of a mowing machine comparatively new, without reference to the particular merits of the several kinds then offered to the public. They felt strong hopes, also, that so large a premium would incite many to try the experiment of mowing with a machine, who would otherwise wait to see whether it was successful or not. In this they were not disappointed, the number of competitors for the premium having been large, and the competition very close.

It will be seen by referring to the report of last year, that although there was but one opinion upon the economy of the machine over scythe mowing, there was a general complaint of bad workmanship; and as each competitor was obliged to report every accident which his machine met with, it did not require complaints on the part of competitors, to convince the Trustees that *there was a screw loose somewhere.* No machine went through the trial without more or less breakages, which, although generally of a trifling nature, involved a certain loss of time.

The offering of the premium of last year resulted most successfully, since it developed a skill which has been too long dormant, and demonstrated very clearly that the mowing machine, if well made and constructed upon correct principles, might be successfully introduced and used as a great labor-saving implement throughout the State.

Having arrived at this point, the importance of perfecting this labor-saving implement, and of having one constructed that should

* See "The Journal of Agriculture, &c., of the Highland Agricultural Society of Scotland." No. 53. New Series.

unite every possible requisite to make its use general, being fully shown by the trials of last year, the premium of one thousand dollars was offered for the best mowing machine, to be awarded the present year. In order to do justice to competitors, and to arrive at a satisfactory result upon the merits of different machines offered in competition, the machines were subjected to separate trials in every possible way, under the inspection of three gentlemen, distinguished for their good judgment and knowledge in every thing pertaining to the matter confided to them, viz.: Col. Moses Newell, of West Newbury, Col. T. W. Ward, of Shrewsbury, and Thomas E. Payson, Esq., of Salem. They undertook the task, with a full conviction of the importance of the duty assigned to them, and devoted themselves to it with unwearied zeal. Their report, which is appended, speaks for itself, and shows the care and labor they bestowed upon the matter, and the conclusion which they arrived at met with the unanimous approval of the Trustees, who, in accordance with the report of the Committee, awarded the premium of one thousand dollars to the Heath machine, entered by D. C. Henderson, of Sandusky, Ohio.

The Trustees have now done all that lies in their power to introduce the mowing machine into use as a great labor-saving implement. They hope not only that it will be adopted, but that it will lead the way to the use of others equally labor-saving and quite as essential to the prosperity of agriculture in Massachusetts. Nor does there seem to be any reason why almost all the labor of the hay harvest, which is at present the most trying and expensive in its nature of any of our farming operations, should not be done by machinery worked by horse-power. The mowing machine, the hay-maker,—such as is now in use in England,—and the horserake, with the aid of two men and three horses, are quite competent to perform the work now required of twelve or fifteen men, allowing only one man per day to the acre, for cutting and making hay.

The farmers have also a duty to fulfil. It is only by their purchasing labor-saving implements, and using them whenever it is in their power to do so, that they can be perfected. In this way encouragement is given to invention and mechanical skill. Agricultural Associations, with their addresses and their premiums, are valuable only as the pioneers in the march of improvement. They can direct public attention to objects, but they cannot accomplish much unless a right spirit exists in the breast of every tiller of the soil. Their labors are of little avail unless their recommendations and exhortations are met by the ready zeal of all. The great cause of agricultural improvement will always falter and move with feeble steps, when those who have it in hand are out-numbered by the listless and apathetic. The obstacles in the way of success to a Massachusetts farmer, are serious enough under the most favorable circumstances, but they are perfectly discouraging, unless they can be met by the united will and firm purpose of all to overcome them. Careful investigation, and the experience gained even by common observation of what is passing in other lands, must convince every reflecting person, that agriculture as a pursuit must languish, unless more strenuous efforts are made to increase our mechanical skill in the cultivation of

the soil; and it is from this strong conviction, that the Trustees thus earnestly speak upon the subject.

Mowing Machines.

To the Trustees of the Massachusetts Society for the Promotion of Agriculture:

The subscribers, selected by your Honorable Board to inspect the work of the different mowing machines entered for premium, and to judge of their merits, respectfully report:

Of the number who had signified their intention to compete for the premium, there were, at the time of our appointment, ten who had complied with the conditions on which it was offered, and had given notice of the places selected by them for the operation of their several machines, to wit: Messrs. J. C. & D. Elliott, A. Dietz, Howard & Wood, Nourse, Mason & Co., J. P. Adriance, A. D. Briggs, R. L. Allen, Jones & Thompson, E. Danforth & Co., and D. C. Henderson.

These competitors were all notified to be in readiness to mow five acres or more of grass in our presence, at the several places by them selected for that purpose, on a particular day named, a day having been assigned to each.

The Messrs. Elliott, Dietz, and Howard and Wood gave notice that they were not prepared to exhibit their machines at the time appointed, and withdrew from the contest.

Messrs. Jones & Thompson exhibited their machine, but did not attempt to mow five acres. They likewise withdrew from competition. Their machine was new, had scarcely before been tried in the grass, and its operation probably afforded as little satisfaction to them as it did to us. In its main features, and particularly in its cutting arrangement, it resembles the machine of E. Danforth & Co. As we shall notice that machine hereafter, it is not necessary to give a further description of this.

The six other competitors each cut more than five acres of grass, the time occupied varying little on the average, from one hour to an acre. The machine entered by Mr. Adriance, was the only one which did its work in less than that time. Five acres and twenty-seven rods were mowed by him, in four hours and fifty-one minutes. In speaking of the time occupied, no deduction is made for stops.

It will be readily seen that these trials furnished very insufficient data by which to judge of the comparative merits of the different machines.

The ground had, in all cases, been selected by the competitors themselves, or by some one in their behalf. The character of the crop, and the condition of the surface varied in different localities. Generally favorable to the successful operation of a machine, some lots were much more so than others. In several instances, horses and driver were perfectly familiar with the working of the particular machine which they used, and both understood exactly what to do to show it to the best advantage. Others were worked at great disadvantage in this respect, and in one case neither horse nor driver had ever seen a mowing machine before.

In order, therefore, to give the machines a fair test on equal footing, as well for the competitors as for our own satisfaction, we concluded to operate them ourselves in the same field, under similar circumstances and in similar grass, with the same pair of horses, and a driver who had no interest in any machine. This seemed to us the readiest and most feasible mode of testing the machines, and in fact the only mode which would enable us to arrive at a decision at all satisfactory, and for which we could give a sufficient reason.

For this purpose, three lots of grass, differing in quantity, quality and situation, were obtained on the farm of Mr. Thomas J. Field, in Northfield, a driver procured who was entirely unacquainted with mowing machines, and five of the competitors notified to have their machines at Mr. Field's farm on the morning of the 29th of July. In the trial, the owners of the several machines were directed to give the driver just such instructions as they saw fit in relation to the management of their machines. Our only instruction to him was, to drive them all as nearly as possible at the same rate of speed.

E. Danforth & Co. were not notified, because, in our opinion, there is an objection to their machine, apparent on inspection, which must prevent its general use in New England. It has two sets of cutters or knives, worked by a double crank in opposite directions, the edges of the blades of the under knife being serrated, and in their operation cutting very like shears. It has no fingers and of course no finger bar, and is probably as little liable to clog as any other machine. In many parts of the West, where it is manufactured, and where a mower may be used a whole season without once touching a stone, it undoubtedly works well. There a blade is rarely broken, while here they are constantly liable to damage, and are in fact often broken. In other machines the blades are riveted or bolted, or otherwise secured to the knife-plate, so that, in case of injury, one can be more or less readily substituted for another. The blades of Danforth's knives are not bolted or riveted upon a knife-plate, but plate and blades are one entire piece of steel, like a saw with very large, blunt teeth. They are, in fact, saw plates. The only way to repair a broken blade, therefore, is to weld it. Now we take it that few mechanics, in a machine-shop even, can weld a broken saw-tooth without injuring or destroying the entire plate. Certainly, in the country, the place where mowing machines are to be used, nobody could be found able to do it. A broken blade would probably involve the necessity of an entire new knife. This seemed to us an insuperable objection to the machine, without looking for others which may or may not exist, and for that reason we did not desire to put the Messrs. Danforth to the trouble and expense of a further trial.

The five other machines were upon the ground at the time appointed, or on the next morning.

The first lot of grass mowed contained about six acres, sown with Timothy in September last. The bottom was not thick, and the ground very far from being swarded over, might appropriately be termed dirty. The crop was not heavy, but uniform in quantity and quality. An acre was mowed by each machine.

We were satisfied at this trial, that any further experiment with

the machine patented by W. H. Hovey, on the 15th of April of the present year, and entered by A. D. Briggs, was not desirable.

Without a drawing it would be difficult for us so to describe its several parts as to make ourselves understood. It is, perhaps, enough to say, that the blades are not bolted or riveted to the knife-plate, and are yet so fastened as to be held firmly and securely in their places by an arrangement so simple that any farmer or laborer can substitute one for another without the aid of a mechanic, and almost without the aid of hammer or wrench, in an instant of time. This we consider a great merit. The knife-plate covers the finger-bar entirely, and being constantly in motion when the machine is in operation, leaves no stationary surface for the cut grass to fall and rest upon. This is claimed, by its inventor, as a great advantage. In its workmanship, also, it is quite equal to either of the other machines. But the amount of draught required to operate it, makes it a very severe load for a pair of the stoutest horses. Whether the power is wrongly applied, or whatever may be the cause, the fact is so. This, if there were no other objection, makes the use of it to any extent, in its present form, entirely impracticable.

The four other machines were tried upon another lot of grass, on pieces of equal dimensions, each in succession, both when the grass was wet, and dry. This was a heavy crop of clover, Timothy and redtop, mixed, some of which was lodged. Portions of the lot were rolling, and the surface generally quite as far from level as are our ordinary grass fields, so that upon the whole, it was an excellent lot to test the machines.

They were also tried on a meadow bottom which had never been ploughed, where various natural grasses, both coarse and fine, were intermixed.

The trial, you will thus perceive, was a thorough one, and by it we were able to form a satisfactory judgment of the merits of the different machines. The remaining machines and between which we were to judge, were patented or known as Ketchum's, Manny's, Heath's, and the Allen machine, entered by R. L. Allen. The owners of the Ketchum machine allege that Mr. Allen has infringed upon their patent, and has no right to build or sell his machine, except within the limits prescribed in a license procured from them, and that Massachusetts is not within those limits. However that may be it is of no consequence so far as our report is concerned, for we did not regard the consideration of that question as within our province, and it therefore had no weight with us. The Ketchum machine, entered by Nourse, Mason & Co., has probably been in use longer in this State, and is more generally known, than either of the others. The one which they entered for premium differs from those which have been built by them in years past, in having a driving wheel of comparatively small size, wrought iron substituted for castings wherever it was deemed practicable, and every thing about the machine so made as to reduce its weight. In this they have succeeded; their machine, with pole and whippletrees attached, weighing only about 460 lbs. The price of the machine has also been reduced from $100 or upwards, to $75. We think that in this they have made no mistake, but that the reduc-

tion in weight is a great mistake. The difference in the amount of draught required to operate a machine of 400 lbs. weight and another of 700 lbs. weight, other things being equal, would probably be almost imperceptible, except by very accurate dynamical tests, and may it not be that the difference would then be found to be in favor of the heavier machine? Without entering into any speculation upon the matter, we think that it was a fact apparent to every careful observer, that this light Ketchum machine actually required more power of draught, when in operation, than either of the four, and that the one which required the least power of draught was almost twice as heavy. So light indeed was it, that with the weight of the driver superadded, and driven at a rate of speed sufficient to cut the grass well,—which, by the way, is a little higher than that required by the other machines,—inequalities in the surface, even slight ones, caused it to bound in such a manner as to throw up the extreme end of the finger-bar several inches above its true cutting level, leaving the stubble uneven and wavy.

Allen's machine required less power of draught than the Ketchum machine. Its weight, with pole and whippletrees, is about 600 lbs. No machine that we have seen is so readily thrown in and out of gear as is this. It has a wooden, instead of an iron finger-bar. In our opinion an iron finger-bar is preferable. The weather cannot affect it, as of necessity it must a wooden one, and the grass which falls upon it leaves it a little more readily. Outside of the driving wheel is a light wheel which runs on a spring axle, and is claimed to be advantageous in turning and in working the machine upon a side hill.

The Manny machine also requires less power of draught than did the Ketchum machine. In this respect, the difference between it and the Allen machine was almost imperceptible. It has a wheel at the end of the knife-bar, which greatly assists in turning and backing, and makes it much more comfortable to transport from one field to another. We think that, other things being equal, a machine with a wheel at the end of the finger-bar has an advantage over a machine without it. Although very different in construction, we regard the Allen and the Manny machines as very nearly alike in point of merit, and if it had so happened that it was necessary for us to decide between those two machines, our judgment would have been made up cautiously and with much hesitation, for each has points of excellence which the other does not possess. Both these machines did their work generally well, but not so well as the work done by the Heath machine.

This, like the Manny machine, has a wheel at the end of the finger-bar. Like that, too, it has a reel, which may or may not be used, as circumstances require. But its cutting arrangement differs entirely from either of the other machines. They each have a single knife, with the blades riveted to the plate, and not operating through cast iron fingers or guards, which, especially when the knife is dull, may be liable to get filled up, and thus clog the blades. Instead of these, this machine has virtually a double set of cutters, the under set being stationary, projecting an inch beyond the upper, and thereby acting in the double capacity of guard *and* cutter. These, as well as the

upper blades, are each independent of the other, and each attached to its bar by a screw bolt. The upper set of blades is held down by a spring pressure bar, so that the operation is similar to that of shears, the grass being cut between two sharp edges, and the machine working nearly as well at one rate of speed as another. In case of accident, therefore, a blade can be removed by any body and another substituted, in an instant of time. Both the upper and lower cutters are made like the best edge-tools in use, of the best cast-steel, with wrought iron backs. The iron furnishing strength, the steel can be made as hard as desirable, without so much danger of breaking by use, and being made hard, do not require to be so often ground. The lower cutter, or guard, as you may please to call it, is half an inch thick and one and one-fourth inches wide. The upper blades are about twice as thick as those used on any other machine. This machine very evidently required less power of draught than either of the others, and did its work the best. The Manny machine weighed about 600 lbs. This weighs about 850 lbs. In its cutting apparatus, which is, perhaps, the most important feature of a mowing machine, we regard it as *very much* superior to either of the others. In its ease of draught, perhaps the next most important feature, we regard it as superior. We regard it also as less liable to clog than any machine with fingers or guards, like those of Ketchum, Manny and Allen. In other *important* features it is equal to the other machines.

We therefore unhesitatingly, confidently and unanimously, express the opinion, that the Heath machine, entered by D. C. Henderson, is entitled to the premium of one thousand dollars, if that premium is awarded the present year.

Moses Newell.
Thomas E. Payson.
Thomas W. Ward.

Boston, September 12, 1856.

An arrangement was made and completed for the transfer of the library to the custody of the Secretary of the Board of Agriculture, at the State House.

An application was made by Mr. Langstreth, for aid in importing Italian bees, and it was referred to a committee with full powers, if they thought it expedient, to aid him to the extent of two hundred dollars. A premium of two hundred and fifty dollars was offered for the best practical essay on the comparative economy of horses and oxen, for farm purposes in Massachusetts, the offer to remain open to 1858.

A letter was received in relation to a bequest of the late Andrè Michaux, the distinguished naturalist of France, payable on the decease of Madame Michaux, to this Society. The sub-

ject was placed in charge of a committee, who subsequently made a full report, the purport of which may be understood from the minute of a later meeting of the Board. The Secretary stated that in pursuance of the votes reported by the Committee and passed at the last meeting, relative to the bequest of the late Andrè Michaux, that all the necessary papers were prepared and had been forwarded to Monsieur Germain, notary at Pontoise, to wit: a copy of the resolutions accepting the bequest; of the vote of condolence to the family of the deceased; a power of attorney executed by the President of the Society, and duly authenticated, in favor of Monsieur Germain; an affidavit made by the President, Vice-President, and one of the Trustees of the existence of the Society, and of its legal right to receive the bequest; a certificate of the election of Monsieur Michaux as an honorary member of the Society, in the year 1816. These documents were translated into French, and both (the original and translated) were duly received and acknowledged by Monsieur Germain.

It is very doubtful, however, if the bequest can ever be made available or useful to the Society, from the nature of the conditions which are attached to it. The facts, as reported by the Committee are, that Monsieur Andrè Michaux, by his will, bearing date the thirtieth day of May, in the year eighteen hundred and fifty-two bequeathed to the American Philosophical Society, of Philadelphia, the sum of fourteen thousand dollars, and to the *Society of Agriculture and Arts of the State of Massachusetts, Boston*, the sum of eight thousand dollars,—and that, in a supplementary and explanatory will, bearing date the eleventh day of October of the same year, and in which he describes himself as a member of both societies, he states the purposes of these bequests, as follows:

"The legacies are made with the same intentions, that is, for the progress of agriculture, principally, in the States of Pennsylvania and Massachusetts, and subordinately in those of New Jersey, New York and Connecticut, New Hampshire and Maine. I express the wish that four fifth parts of these two legacies shall be invested by these two Societies, in buying a little farm or lot of land, to be cultivated in cereals or grasses,

so that the yearly grant may be employed at the end of each year in honorary premiums, to arboriculturists or horticulturists, who may have introduced, cultivated or improved useful trees or vegetables, either indigenous or exotic, or even remarkable for their beauty, but which shall nevertheless grow in the open ground. The authors of papers in these two rival branches of economy, arboriculture and horticulture, who shall have produced, or read before these two learned societies, shall have a right to these premiums, if they shall have been adjudged by these societies worthy of publication. These premiums might be in medals of gold or silver, or works treating of agriculture, or horticulture. The remaining fifth part of each of these two sums, that is to say, twenty-eight hundred dollars for the Philosophical Society, and the other, of sixteen hundred dollars for the Agricultural Society of Massachusetts, shall be invested, four fifth parts in buying, on the borders of the sea, one or several lots of sand and soil, and also some lots in the mountainous regions, the most stony, or most boggy and quaggy soils, considered hitherto so unproductive as not to have been cultivated, soils which I shall show them can be made very useful and profitable, by the culture of resinous trees."

"The other fifth part of these two sums, that is to say five hundred and sixty dollars, and three hundred and twenty dollars shall be employed by these two societies in sowing and in planting these lands as I shall direct, in a kind of instruction in which I shall make known the means which have succeeded best in France, with those soils which have remained for centuries uncultivated and spoiled by complete sterility."

The Committee after stating the facts, proceed to say, "it will be observed that this Society is not accurately described by its corporate name; but it is believed that no doubt can exist that it is the same intended in the will, as there was then no other existing to which the description could apply, while it does substantially indicate this; and inasmuch as he appears upon our rolls as an honorary member, and no other society of the like kind, in this State, can be supposed thus to have enrolled his name, the identity of this Society with that designated in the will, appears to be clearly established. It may be further remarked

that the entire will has not been received, and the extracts which have been furnished are translations, and not in the original language of the will."

At the February meeting, Mr. Winthrop, who represented the Society as delegate to the State Board, stated that a proposition had been brought before that Board to hold a State Agricultural Show the coming autumn, and that the aid of this Society was solicited. After a full discussion, it was the unanimous opinion of the Trustees that it would be better to delay it for another year, as it would interfere with the county shows, the arrangements for which were generally made; at the same time the Board was desirous of meeting the views of the State Board, which from its composition was the best judge of the matter. Mr. Winthrop was therefore instructed to say that if the show were concluded upon, to be held the present year, this Society would contribute the sum of two thousand dollars in premiums, or if it should be postponed to the following year, he was authorized to pledge the sum of three thousand dollars towards carrying it out.

A letter was received from Mr. Harvey Dodge, of Sutton, in relation to the importation of stock by the Society, which was referred to a Committee. At a subsequent meeting that Committee made a report, from which the following are extracts:—

"That the disposable funds of the Society are insufficient at the present time to permit any expenditures, of the comprehensive nature proposed by Mr. Dodge. In the opinion of the Committee, however, looking back to the past history of the Society, its usefulness has been more apparent, more marked and more permanent in its character, through the efforts it has made for the improvement of stock, by importation and otherwise, than in any other field of its labors; and it is deeply to be regretted that these efforts should not be systematically and steadily continued. With the present income of the Society, however, much of which is usefully and properly applied to the promotion of agriculture in other branches, but little can be done in the way of importation or care of stock."

"The Committee have been led to consider, in consequence of the letter of Mr. Dodge, and of other similar applications,

whether some plan could not be adopted of a permanent and practical nature, having for its principal object the improvement of all kinds of farm stock. To do this, it is not only necessary that it should be carefully selected with a view to its adaptability to our soil, climate and uses, but also that when brought together, it should be kept in such manner as that pure races should be bred, and kept up to the highest point of excellence, with a view of their being disseminated in that condition throughout the State."

As the subject is now under consideration of the Trustees, the plan for doing this, proposed by the Committee, is not inserted.

The day of the meeting of the Board was changed to the second Friday of each month, to accommodate Trustees living at a distance from the place of meeting, when impossible or inconvenient to go and return the same day.

Benjamin Guild resigned his office as Assistant Recording Secretary, after the annual meeting in June, 1856.

The Committee, on the resignation of Mr. Guild, reported the following resolutions:—

"*Resolved,* That the Trustees have received, with sincere regret, the resignation of Benjamin Guild, Esq., who has faithfully and gratuitously discharged the duties of Assistant Recording Secrectary of the Society, for a term of nearly forty years.*"

"*Resolved,* That the grateful acknowledgments of the Trustees, and of all the members, are due to Mr. Guild for his intelligent and earnest efforts to promote the interests and objects of the Society, during so large part of its existence, and that we cannot forget that the term of his service includes a period when the Massachusetts Society had but few coadjutors in the cause of agricultural improvement, and when the duties of its officers,

* The duties of Recording Secretary were so much increased by the establishment of annual shows, that an assistant became necessary. Upon the recommendation of the Board of Trustees, the Society, at its annual meeting in 1818, created the office of Assistant Recording Secretary, and elected Mr. Guild to fill the same. Since that period the records have been kept by him to the present time, both of the doings of the Society and those of the Trustees. The shows having been discontinued, the vacancy created by the resignation of Mr. Guild has not been filled. Mr. Guild died on the 30th day of March, 1858.

and particularly of its Recording Secretary, were highly important, responsible, and arduous."

"*Resolved,* That an attested copy of these resolutions be communicated to Mr. Guild, and that they be laid before the whole Society, at its next annual meeting, for entry upon its records."

Hon. John C. Gray also resigned his office of President and Trustee during this year, having been a member of the Board for twenty-nine years, and its presiding officer for ten years, and the thanks of the Trustees were presented to him "for the faithful and efficient service rendered by him to the cause of agricultural progress and improvement, by the discharge of his official duties, so honorable to the Society and so beneficial to the public, and by his writings and example."

George W. Lyman, Esq., senior Vice-President, succeeded him in office, and the vacancy in the Board was filled by the election of David Sears, jr., Esq.

A. D., 1857.

The Trustees having disposed of their Jersey stock, the question came up, as to the expediency of continuing the efforts which have been made by the Society from almost the commencement of its existence, in improving our breeds of cattle by importation of superior stock from England. Aided by past experience and by careful inquiry, as to the effect produced by bringing different breeds into the State, and looking at the wants of Massachusetts farmers in this respect, it was concluded that the introduction of good Ayrshire cattle would, on the whole, be the most advantageous for the State. The funds of the Society are not large enough to import many animals, and it was thought best to confine its efforts to one breed, and to keep the stock together, instead of distributing it as heretofore, disposing of the animals that shall be raised from it, from time to

time, in such a manner as to secure its increase, and permanence in the country. In accordance with these views, the sum of fifteen hundred dollars was appropriated in November last, for the purchase and importation of Ayrshire cattle. The season, however, was so far advanced, that it was thought expedient to defer sending out until the spring.

The Committee to whom the subject was referred, reported at the meeting in May, that they had made an arrangement with Mr. Sanford Howard to go out to England for the purpose of selecting and purchasing Ayrshire stock, four bulls and ten heifers, the cost of which they estimated, including the expenses of Mr. Howard and the passage of the animals, would not exceed thirty-four hundred dollars. They recommended that the appropriation heretofore made for this object be increased to this sum, (afterwards increased to thirty-five hundred dollars.) The instructions to Mr. Howard were "to purchase stock known here as the Swinley, color reddish brown, irregularly spotted with white, and small brown spots in the white. Horns, usually irregularly shaped, small horns preferred, thin in the neck, escutcheon mark desirable. Age of bulls from nine to twelve months, heifers two years old, and in calf by superior bulls. These directions to serve only as a general guide, great reliance being placed upon Mr. Howard's judgment in selecting superior animals. If the cost should exceed the estimated amount, the number of animals to be decreased, but not the quality, which must be the best that can be obtained. The animals to be shipped in two different vessels, and the arrangement for freight to be made before final purchase." The report was accepted, the appropriation increased as recommended, and the committee was requested to keep the subject in their charge until after the animals shall have arrived in the country, and a permanent disposition made of them.*

An application was made to the Board requesting the Trustees to import Devon stock. It was declined, for reasons which will be apparent on reading the preceding pages, and also, be-

* Mr. Howard took out orders from individual Trustees and others, to a large amount, for stock of various kinds, so that much good is expected to result from his mission.

cause in the opinion of the Board, there was already in the country as good Devon stock as could be purchased in England, which can be obtained at a comparatively moderate cost.

At the meeting of the Board in August, an account of the successful working of the Heath mowing machine in England was read, it having received the highest premium as a mower, from the Royal Agricultural Society in England. A discussion took place as to the cause of the want of success by those made for use this season, by Nourse, Mason & Co., who had purchased the patent. It was stated that the machine which went out to England, and the one which received the Society's premium the last year, were made at Sandusky, Ohio, and that the latter had been in successful operation during this season, by the person who purchased it after the award. It was decided to refer this matter to the Committee, under whose supervision the competing machines were placed, Messrs. Newell, Payson and Ward, and by whose recommendation the award was made, to investigate as to the working of the machine the present year. That Committee subsequently reported that the machine made by Nourse, Mason & Co., was defective in workmanship, and varied in some essential particulars from the original Heath machine. This had arisen partly from a serious injury to Mr. Nourse, who had been prevented from giving his personal attention to the matter. The Committee transmitted a letter received from the purchaser of the Heath Mower confirming their original opinion as to its excellence and superiority. The Committee could not, therefore, "retract the opinions they had given as to its superiority over the other competing machines, contained in their report."

It having been stated that great improvements had been made in tedding or hay-making machines in England, by which a great saving in labor had been effected, it was voted to order two of them, in order to set them in operation and test their usefulness here, and, if found to be adapted to the wants of Massachusetts farmers, to encourage their manufacture and use. These machines have been received, and are operating successfully, and it is hoped that they will prove as important labor-saving implements as the mower is, upon all tolerably well-prepared lands.

The following premiums were offered for Essays :—

I. An inquiry as to the best breed of Cattle for the State of Massachusetts, taking into consideration *beef, milk*, and *work*. Does such a breed exist? If not, can it be made, either by crossing known breeds, or by selection, without reference to breed?

II. Manures, natural and artificial. The best mode of preparation. The best mode of application,—having especial reference to the soil, climate, and crops of Massachusetts.

III. The most useful system of instruction, by which to acquire a practical agricultural education, such as would fit a young man to commence the business of a farmer upon the average farming lands of Massachusetts.

IV. Best Essay on the advantages to be derived from establishing regular fairs or market days throughout the State, for the sale and exchange of agricultural products, together with the best practical method for commencing and continuing them so as to create new markets to the farmer.

No Essay will be entitled to a premium, unless it shall be considered by the Trustees or by those appointed to decide upon its merits, to be of sufficient practical value to agriculture, to make it worthy of publication in the Transactions of the Society. The Essays must be sent in to the Secretary on or before October 1, 1858, and the name of the author must accompany his Essay, sealed up in an envelope, and not to be opened unless a premium is awarded to the writer.

A Committee was appointed to offer premiums on root crops. The Chairman reported, at a subsequent meeting, that inasmuch as premiums were offered for these crops by the County Societies generally, and as they can best supervise the method of cultivation pursued by competitors within their respective limits, and from the inherent difficulties of a formal examination of any particular crop throughout the State, it was not considered expedient to offer premiums for crops of this nature. It was recommended however that a premium should be offered, to be continued from year to year, or in some other form, so as to comply

with Statute, Ch. 42, Sect. 6, for the raising and preserving of oaks and other forest trees, best adapted to perpetuate within the State an adequate supply of ship timber.

In pursuance of the above recommendation, it having been stated that the object intended by the statute above referred to, was to secure the raising and perfecting the growth of forest trees, and not simply planting them—that this could not be accomplished by annual premiums as for a vegetable crop—that the terms of the statute are fully complied with, both in the letter and in the spirit, by offering annually a premium, payable at a distant day, whereby the object of offering it can be attained, the following premium was recommended and finally adopted.

Premium of One Thousand Dollars.

"The above sum is offered for the best plantation of trees, of any kind commonly used for, and adapted to, ship-building, grown from seed planted for the purpose, or otherwise, on not less than five acres of land, one white oak at least to be planted to every twenty square yards. Notice in writing must be given to the Secretary of the Society, on or before January 1, 1860, of the intention to compete for the premium, stating where the land is situated, the nature of the soil, and what has been done in relation to the plantation up to the time of giving notice. The premium will be awarded in 1870, in case the success of any competitor has been such as, in the opinion of the Trustees, or of those appointed by them to adjudge the same, to give a reasonable probability that the plantation will produce eventually a fair supply of ship timber, in proportion to the number of acres planted. The Society likewise claims the right, after awarding the premium, to designate from time to time what trees shall be reserved for timber, and the successful competitor shall give security, that the trees so designated shall not be cut for any other purpose."

ANNUAL REPORT TO THE STATE.

1858.

The Massachusetts Society for Promoting Agriculture, *beg leave to offer the following Report:*

The operations of the Society during the present year have been mainly confined to the offer and award of premiums for essays upon subjects calculated to awaken a spirit of useful inquiry upon points deemed vital to the prosperity of agriculture in Massachusetts: to the importation and dissemination of seeds, with a view of inciting farmers generally to a more extended cultivation of root crops, especially beets and turnips: to printing for gratuitous distribution, several selected essays upon topics important to every agriculturalist, and also the essays for which premiums have been awarded; and to the importation of a herd of Ayrshire cattle, for the purpose of improving the dairy stock throughout the State. An abstract of the doings of the Society from its commencement has likewise been printed, which is intended to form the beginning of a new series of publications upon agricultural subjects. The Ayrshire herd has, with the exception of the two-year-old bull sent into Worcester County, been placed temporarily upon the farm of the Essex Agricultural Society in Topsfield. A description of the stock, taken from the Report of Mr. Sandford Howard who purchased it for the Society, is hereto appended, in order that a pedigree of the animals may be preserved in the Annual State Agricultural Report, where it can always be readily referred to.

The Trustees of the Massachusetts Society wish also to call the particular attention of all those interested in the subject, to a new labor-saving implement, two of which they imported this year from England with a view of thoroughly testing the merits of the machine. It is called a tedding machine or haymaker, and after a constant trial during the haying season, they can confidently recommend it as being a most valuable labor-saving implement. It is earnestly hoped that successful

efforts will be made without delay, to have a similar machine manufactured in Massachusetts, at a price which will bring it into general use. The imported machines will be placed at the disposal of any responsible manufacturers, who shall apply for them. A description of the working of these implements is given in the letters of Messrs. Lyman and Loring, which are annexed.

It is a matter of especial congratulation, that there is an evidently increasing interest awakened upon the subject of agriculture in Massachusetts, and a better direction seems now to be given to the efforts at progress in this highly important branch of industry. There is a wide field for improvement and a fair encouragement for those who may choose to enter upon it. The improvement of our stock of all kinds, both as it regards selection of a better class of animals to breed from, and greater care as to their food, shelter and general management,—the introduction and use of labor-saving implements,—a better system of markets, and the adaptation of our husbandry with reference to them,—the education of young men with a special view to their following the occupation of a farmer,—all these points should be kept in view by those who seek to promote the cause of agriculture in Massachusetts.

This Society is, as it has ever been, desirous to co-operate with the other Agricultural Societies in every measure which shall tend to a steady and substantial advancement of agricultural improvement; acting under the firm conviction that, in so doing, a great philanthropic as well as patriotic work will be accomplished. It is intended to print annually a volume containing articles of importance to the farmer, and communications from all persons interested in the subject of agriculture are solicited. To each of the other Societies will be intrusted a certain number of copies for distribution.

The following premiums are offered by the Board of Trustees for the year 1859, which will, it is hoped, excite a wide competition.

1. A premium of one thousand dollars for a plantation of forest trees.

For the particulars of which, see page 149, ante.

2. A premium of five hundred dollars for the best conducted farm.

The above sum is offered, in one premium, for the best conducted farm in Massachusetts, of not less than forty acres, taking into consideration the mode of cultivation, farm buildings, breeding, selection and keeping of stock. Farms devoted to market gardening will not be admitted to competition. The Trustees reserve the right of withholding the premium, in case no farm offered shall be considered worthy of it, and also of dividing it, in case no one farm shall be considered decidedly the best conducted. Notice of intention to compete for the premium must be given to the Secretary of the Society, on or before the first day of April, 1859, accompanied by the payment of an entrance fee of ten dollars. A written statement, verified by the oath of the competitor, will be required, containing an accurate statement as to the management of the farm, with an account in figures showing the results of the year's operations. The account to commence on the first day of April, 1859, and to terminate on the thirty-first day of March following. All farms entered for the premium shall be subject to the visits and inspection of the Trustees, or by others appointed by them for the purpose. No Trustee or officer of the Society will be allowed to compete.

3. A premium of one hundred and fifty dollars for the best Essay on the best breed of cattle, taking into consideration beef, milk and work, adapted to the wants of this State. Does such a breed exist? If it does not, can it be made by crossing or selection? The premium not to be awarded, unless the Essay shall be considered by the Trustees of sufficient value to be printed in the Transactions of the Society. The essays to be sent in to the Secretary, on or before October 1, 1859.

All which is respectfully submitted.

GEORGE W. LYMAN, *Pres't.*

RICHARD S. FAY, *Sec'y.*

Boston, December 10, 1858.

APPENDIX.

DESCRIPTION AND PEDIGREE OF AYRSHIRE CATTLE, IMPORTED BY THE MASSACHUSETTS SOCIETY FOR PROMOTING AGRICULTURE, 1858. PURCHASED IN SCOTLAND BY MR. SANDFORD HOWARD.

BULL, No. 1. ALBERT, brownish red and white, two years old, purchased of John Steele, near Ochiltree, bred by James Hendrie of Drumdrock, sire, Jock, bred by Mr. Bowie, of Riccarton, winner of the 1st prize at Killock cattle show, 1855. Grandsire, Geordie, bred by Mr. Hendrie, winner of the second prize as a two-year-old, at Galston, 1849, and the second as a three-year-old, 1850. Dam, Kirstie, by Geordie (before mentioned), grandam, Nancy, (never shown), by Hilburnie, the winner of the first prize as a two-year-old, at Galston, 1845; also, the first at Grongar, 1846.

Albert won the second prize as a yearling, at the show of the Agricultural Association, 1857; also, the first prize at Ochiltree same year, and the second prize at same place as a two-year-old, 1858. Mr. Howard says, "With the exception of Mr. Parker's bull, which took the prize over him at Ayr, he is the best of the breed, of his age, that I saw in Scotland."

No. 2. TROON, brownish red, with a few small white spots, two years old, purchased of Andrew Aiton, Esq., of Craigend, near Troon, bred by Mr. Kirkwood, of Highland Muir. Sire, bred by John Parker, of Nether Broomlands. Irvine, dam, considered one of the best in Mr. K.'s herd.

No. 3. TAM SAMPSON, brownish red and white, white predominating, one year old, purchased of John Mickle, bred by Andrew Aiton, who says: "He was got by a bull that was from a cow which gained the first prize at the county (Ayr) show; his dam, a cow bred by myself, whose grandam gained several prizes. I consider him as well bred as any bull in the county."

No. 4. IRVINE, color red. Calved May, 1858, purchased of and bred by Mr John Parker, of Nether Broomlands. Sire, bred by Mr. Parker, winner of several prizes and of the noted family possessed by him for nearly thirty years. Dam, bred by Mr. Parker, winner of the first prize at the county show, she is also dam of the cow which took the first prize in 1858. Mr. Parker says: "The dam of the bull-calf gained the medal at the Ayr county show when two years old, and when in milk gained many prizes at Ayr, and other shows. The dam of his sire has also gained many first prizes."

HEIFER, No. 1. MISS AITON, light red, flecked with white, three years old, purchased of and bred by Andrew Aiton. Sire, dam and grandam bred by Mr. Aiton, bulled by Troon, July 16th.

No. 2. Mavis, brownish red and white, spotted, two years old, purchased of Mr. Aiton, bred by John Dunlop, near Stewarton, whose breed is reputed to be of very fine quality, bulled by Troon, July 9th.

No. 3. Lilly, brownish red and white, white predominating, one year old, purchased of and bred by John Parker, sire and dam bred by him. The latter is also dam of the celebrated bull, Cardigan, who has taken twenty-four first prizes. Lilly is a twin, and a late calf last year.

No. 4. Panzy, brownish red, with a few patches of white, one year old, purchased of and bred by John Parker. Sire, bred by Mr. Parker, and got by Cardigan's sire. Dam, bred by Mr. Parker, and "winner of many prizes."

No. 5. Daisy, brownish red and white, one year old, purchased of and bred by David Wilson, of Irvine. She is seven-eighths of the blood of Mr. Parker's herd.

No. 6. Harriet, light red and white, two years old, purchased of John Mickle, of Brownhill, near Tarbolton; bred by Mr. Campbell, of Woodside, Monckton, and said to be out of the best cow of his herd. In calf by a son of Cardigan.

No. 7. Ruth, light brown, one year old, purchased of James Mickle, of Claxton, near Tarbolton, bred by Mr. Campbell, of Dalgig. Sire, Cardigan. Dam, a fine cow owned by Mr. Campbell.

No. 8. Miss Markland, light red, two years old, purchased of and bred by James Reid of Torcross, near Tarbolton. Sire, bred by Mr. Reid, grandsire, won the first prize at the Ayrshire show, as the best aged bull. Dam, bred by Mr. Reid, a superior cow, grandam also bred by him, and a winner of several first prizes; bulled by Mr. Reid's Sir Colin, July 7th.

No. 9. Miss Smith, red, two years old, purchased of and bred by George Richmond, near Dalrymple. Sire, Geordie, who was by Kilmaurs, whose dam won several prizes. Dam, sister to Young Crammy, winner of several prizes.

No. 10. Rosa, light red and white, two years old, purchased of and bred by Hugh Lambie, near Tarbolton. Sire, Alexander. Dam, Jean, both bred by him from Ayrshire stock kept by him for twenty years.

No. 11. Miss Anderson, brownish red and white, white predominating, two years old, purchased of James Anderson, of Kirkhill, near Ayr, bred by Alexander Bruce, of Shawe, out of one of his best cows, and reputed fisrt rate stock on both sides.

WALTHAM, SEPT. 1, 1858.

MY DEAR SIR,—

I have the pleasure to report to you about the working of the Tedding Machine imported by the Trustees of the Massachusetts Society for Promoting Agriculture.

The machine has been used with great advantage, and has given satisfaction to the haymakers. No part of it has broken, or yielded to the hard work done by it. It has been applied to the swarths laid by the mowing machine when they were dry enough to be turned and in the direction of the mower. If grass is cut by the scythe it works best by being driven across the swarths.

The machine has two motions, communicated by geers in the hubs of the wheels—one forward, which lifts the grass and throws it above, over, and behind the machine. The other motion is a reverse one, lifting the grass and throwing it behind. Both motions lift, open, and spread the grass, more perfectly than can be done by a man and fork, and the machine does its work as fast as a horse carries it forward. It is heavy, does much work very quickly, and requires one good horse to draw it. I have been away from my farm much of the time of haymaking, but I may safely say that the men who have used it commend it highly as a labor-saving machine, doing its work without any delay.

The machine weighs 1090 lbs. Wheels, axle and frame-work, are iron.

Very repectfully, your obed't serv't,

GEORGE W. LYMAN.

TO R. S. FAY, ESQ.,

Secretary of the Trustees of the Massachusetts Society for Promoting Agriculture.

SALEM, AUG. 21, 1858.

MY DEAR SIR,—

I desire to express to you the satisfaction I have derived from the use of the Tedder imported by you for the Massachusetts Society for Promoting Agriculture. It was sent to me by Mr. Motley, after he had used it, and I only regret that I could not obtain it sooner. The difficulties we have all met with in making hay during the uncertain weather of this season, have given us peculiar opportunities for testing the value of any machine intended to facilitate the process of drying. And I was surprised to find with how much greater ease I could overcome these difficulties after I obtained the Tedder than before. With diligent use of the machine, I found one good drying day sufficient. Hay, which under the ordinary treatment would have been raked and cocked as unfit to go to the barn until the next day, was thoroughly made by applying the Tedder twice in the afternoon. And every farmer knows the value of this in a season when every "next day" was almost sure to rain.

The machine works with great rapidity and ease in almost all places. I tried it on rough land and smooth with equal success. I used it on hay lying in swath and in windrow opened by the fork, and it worked equally well in both instances. I found that it would thoroughly spread an acre of grass in fifteen minutes, without extra exertion—and the work when done was really done as no man with a fork could have done it, in any length of time. Not a particle of the grass had escaped exposure to the sun and air.

The construction of the machine is simple, strong, and entirely appropriate to the work. I found it better in heavy grass to use two horses, tandem, as the weight was rather more than I liked to put upon one—although this was choice, and not necessity. It required no repairs during my use of it.

I can safely say, that I have found no labor-saving machine more perfect. It enables us to make our hay easily, rapidly, and thoroughly, and makes us entirely independent of that kind of manual labor which requires constant watching, especially in the process of spreading and turning hay, and which is all that can be obtained in these modern days. It seems to me almost indispensable on large farms. After I obtained it, I set apart a field of about five acres for experiment in machinery. It was cut with the simple and admirable grass-cutter, Danforth's patent, sent to me by Mr. Thompson, of Greenfield,—it was spread with the Tedder,—it was raked with the horse-rake in common use—and was ready for the barn, without having had any manual labor applied to it, except to open the windrows, the morning after it was cut. I can only say that no five acres of my grass this season have been made into hay with half the economy and expedition that I was able to apply to these, by means of machinery.

I would express my obligations to you for bringing the machine into my notice, and I really trust our farmers will, ere long, be enabled to obtain them at reasonable prices, and of American manufacture.

Truly, your friend and serv't,

GEO. B. LORING.

R. S. Fay, Esq., *Secretary.*

[CIRCULAR.]

Massachusetts Society for Promoting Agriculture,
Boston, Dec. 10th, 1858.

SIR,—

It is thought by many intelligent farmers that much good would result by a greater attention to Sheep-Husbandry, in this Commonwealth, considered as a matter of simple profit, besides improving the land. It is a constant subject of complaint, that our pastures are running out; and inquiry is constantly being made, how they can be renovated. There are a great many thousand acres in the State which have become too impoverished to afford pasturage for cattle, and which are too rough for cultivation. There is no doubt but much land of this character might be improved by grubbing up the bushes which have been gradually overspreading them, and by the application of plaster, or other manures, in the form of top-dressing. This, however, requires a large outlay of capital. If sheep will thrive upon worn-out pastures, it becomes an interesting subject of inquiry to ascertain whether they can be profitably used for this purpose. The following questions have been prepared by order of the Trustees, for the purpose of getting all the information possible upon this subject, which it is proposed to embody in a Report. An early answer to the questions herewith submitted, together with any suggestions you may think proper to make upon the subject, will be thankfully received.

Very respectfully, your ob't serv't,

RICHARD S. FAY.

QUESTIONS.

1. To what extent is Sheep-Husbandry carried, in your town and county?

2. What kind of sheep is usually raised,—long-wooled, or short-wooled?

3. What is your calculation of the profits to be derived from sheep; taking into account food, labor, &c.?

4. What is the usual winter management of sheep—especially housing and feeding?

5. What is the usual summer management—especially as to shearing, weaning, pasturing, and folding?

6. At what time is it most profitable to have your lambs dropped? with the reasons therefor?

7. Are there any impediments in the way of sheep culture in your county? and if so, state what they are—with any suggestions for their removal?

8. Has the statute passed in the session of 1858, to indemnify sheep owners for the ravages of dogs, been enforced in your town? Can you suggest any amendment to the law, to render it more effectual for the purpose intended?

9. Do sheep, in your opinion, improve pasture-lands? and will you state what kind of land is the most improved by them?

[NO. 1.
NEW SERIES.]

ON THE

HISTORY, CULTIVATION, COMPOSITION,

AND

FEEDING PROPERTIES

OF

MANGOLD WURZEL.

BY

JOHN TYNAN,

A PUPIL OF THE ALBERT NATIONAL AGRICULTURAL INSTITUTION.

REPRINTED, FOR GENERAL DISTRIBUTION, FROM THE DUBLIN EDITION, BY THE MASSACHUSETTS SOCIETY FOR PROMOTING AGRICULTURE.

"WORK AND LEARN."

BOSTON:
1858.
J. H. EASTBURN'S PRESS.

NOTICE.

The annexed extracts from "The Journal of the Chemico-Agricultural Society of Ulster," (No. 12, New Series) fully explain the circumstances which induced me to attempt writing on the Cultivation, &c., of Mangold Wurzel.

JOHN TYNAN.

ALBERT NATIONAL AGRICULTURAL INSTITUTION, GLASNEVIN, *Dublin*, 1*st March*, 1858.

CHEMICO-AGRICULTURAL SOCIETY OF ULSTER.

COUNCIL MEETING.

JANUARY 1.—John Andrews, Esq., J.P., High Sheriff of Down, and afterwards William Sharman Crawford, Esq., D.L., Vice President, occupied the chair. There were also present—Rev. George Smyth, Carnmoney; Professor Hodges, chemist to the society; Professor Thomson, C.E., Queen's College; Dr. Hamilton, Belfast; W. B. Ritchie, Hon. Secretary; Robert Shaw, Ballymechan; Geo. C. Hyndman, Belfast; Oliver Devlin, Ulster Model Farm."

PRIZE ESSAY ON THE CULTIVATION OF MANGOLD WURZEL.

Dr. Hodges read the following letter, which he had received from Dr. Kirkpatrick, Head-Inspector of Agricultural Schools, in reference to a copy of a prize essay which he forwarded, and which was directed to be published in *The Journal*:—

"*Albert Institution, Glasnevin, Dublin,*
29*th December*, 1857.

MY DEAR DOCTOR,—A distinguished American agriculturist,* who visited the Albert Institution and Farm in autumn last, was so greatly pleased with the mangold wurzel crop that he begged I would favor him with full particulars relating to it, the preparation of the land, the manures applied, and the after-management of the crop. It struck me that the making out of such a statement as he expressed a wish to have, would be a useful exercise for the pupils, and at the same time test the agricultural knowledge which they had attained, and show their capabilities of composition, &c. I accordingly offered one or two prizes for the best written essay on the history, cultivation, &c., of mangold wurzel, and shortly afterwards received about twenty essays. As it was most desirable that the merits of the several essays should be decided upon by a person not only competent to form an accurate opinion, but who was also unacquainted with any one of the writers, I submitted them to my friend, John Fisher Murray, Esq., who most kindly and obligingly gave them a minute and

* Henry F. French, of Exeter, N. H.

careful examination, and I now annex the following gratifying extracts from a letter which I have just received from him:—

"'John Tynan's essay is the best, reads most fluently, while containing all the information of any of the others; the paper of Wm. Birnie deserves honorable mention for fluency of style; that of Patrick Cooke for the minuteness and precision of the details; and that of George Elwood for the neatness of penmanship, besides a fair store of the merits ascribed to the former ones.

"'It is a very close run; the competitors tread upon the heels of each other; the winners come in at no very great distance before the rest.

"'All the essays are creditable; not many years ago it would not have been credited that so many productions, respectable alike in matter, arrangement, and style, could have emanated from young men accustomed to labor with their hands.

"'The young men, the institution, and the public at large may congratulate themselves and each other upon the prospect opened to society by such productions as the essays in question.'

"I herewith send you Tynan's Prize Essay, which, I think, should be published, as it contains a large amount of valuable and useful information on the cultivation, &c. &c., of a green crop, which, in my opinion, merits greater attention than it has hitherto received from the agricultural community.

"I shall not distribute the prizes amongst the successful competitors until you come to us, which, I hope, you will be able to do in the early part of next week.—I am, dear Doctor, yours faithfully,

"THOMAS KIRKPATRICK.

"Professor Hodges, &c. &c., Belfast."

Dr. Hodges having read the prize essay referred to in Dr. Kirkpatrick's letter,

John Andrews, Esq., said that he had had many opportunities of observing young men who had received their education at the Agricultural Schools of the National Board, and also at the Templemoyle School, and he considered that the training which was given to the pupils in these institutions was of the most useful kind, and of great importance to the country. He thought that they should thank both Dr. Kirkpatrick for the essay forwarded, and also express their opinion of the value of Agricultural Schools in the present circumstances of the country.

Dr. Hodges, Professor Thomson, and the Chairman, having expressed opinions in accordance with the views of the High Sheriff, the following resolutions, on the motion of Mr. Andrews, seconded by Professor Thomson, were unanimously adopted by the meeting.

It was resolved—'That the thanks of this Society be given to Dr. Kirkpatrick, for his attention in communicating this essay, and that he be informed that for the purpose of giving it extended circulation, it shall be printed in the Journal of this Society.'

"Resolved—'That this Society cannot fail to recognise the important advantages conferred on the Agricultural community by the Albert Institution in the education of young men, who are destined to conduct and direct the practice of Agriculture in Ireland, of which

the essay now before us, being one of twenty, and all of which have received commendation from the judge to whom they were submitted, is a striking proof.'

"Resolved—'That this Society desires to express its anxious hope and expectation, that abstract views of economic science will not be permitted by the Government of this country to interrupt the progress of Agricultural instruction at the Albert Institution, and the local establishments under the care of the Commissioners of Education, which, in the yet unimproved and backward state of the art of Agriculture in Ireland, is so well calculated to contribute to the promotion of national prosperity.'"

ESSAY.

History of the Plant.—Mangold Wurzel, or, as it is often called, "Mangel Wurzel," which signifies "*root of scarcity*," has been, like all our cultivated green crops, obtained by culture from the original wild species.

Botanically considered, the Mangold Wurzel (*Beta Vulgaris Campestris*), or, as it is sometimes called, "field beet," is a species belonging to the genus *Beta*, which is contained in the class *Pentandria* and order *Digynia* of the Linnean system of classification, and in the order *Chenopodea* of the natural system.

It was introduced into Great Britain from the Continent of Europe at no very remote period; but the precise time is not easily ascertained, as a considerable diversity of opinion exists amongst authors on this point; probably it was the year 1773, as would appear from the following extract, taken from *The Penny Cyclopædia of the Society for the Diffusion of Useful Knowledge*:—"The common field-beet for cattle, which has been long known in Germany, was introduced into England at the latter end of the last century," to which it may be proper to add, "and its introduction is generally attributed to the late Dr. Letsom, a physician of great reputation, and one of the Society of Friends." At its first introduction it was grown only by a few enterprising gentlemen, but it gradually extended, and subsequently found its way into this country, where it was, (like the potato at its first introduction,) for a long time looked on as a curiosity, rather than cultivated as a useful auxiliary to cattle feeding. At length the success which attended its cultivation by a few individuals who ventured to give it a trial, induced others to follow their example, and it thus gradually, but steadily progressed, till, at the present day, it holds such a place in the green cropping of this country, as no longer to deserve the title of *root of scarcity;* but, at the same time, is not yet cultivated to such an extent as its merits seem to entitle it.

Climate and Soil.—It is capable of accommodating itself to a great range of climate, flourishing in Europe, between the parallels of 46° and 56° north latitude (if the situation be not too bleak or exposed), fair crops having been raised in the latter latitude in Scotland; but the climate which is considered to be best suited to it is that of the south of England, where frosts do not set in early, and which has a high summer temperature. In this country, where the summers are

not so warm as in England, though enjoying a mild and genial climate, with a more moist and humid atmosphere, large crops have been obtained. "Local climate," says Professor Johnston, "modifies very much the relative quantities of the same crops obtained in different localities. Thus, in the Southern part of Wigtonshire, 30 tons of Swedes, 20 tons of Mangold, and 20 tons of White Carrots per acre, are equivalent crops, while in Berkshire, it is as easy to grow 30 tons of Mangold as 20 tons of Swedes per acre."—*Elements of Agricultural Chemistry*, p. 341.

It likewise adapts itself to a great variety of soils, having been grown in this country on nearly all descriptions of land, yielding remunerative crops even on light soils, provided they be not too light and gravelly, and on clays that are not of too stiff a texture; it will, however, yield fair crops on clays too stiff for turnips; but it attains its greatest perfection, and yields its maximum produce only, on a deep, friable loam, in good condition, and which contains a considerable quantity of vegetable or organic matter, with a sound, dry subsoil, and in a situation not too exposed. It also yields very heavy crops on reclaimed bog-land, rendered sound and dry by judicious improvement.

"It is suited," says Mr. Bond, "to our dry climate. It will grow as well on the stiff soils as upon the light; it is peculiarly a heavy land root; its early maturity suits the retentive soil, as it can be harvested before the wet season sets in, and its keeping property renders it invaluable, especially on such lands, because of the lateness of the growth of the grass for food in spring."—*Farmer's Magazine.*

Varieties as Adapted to the Different Soils.—Like all our cultivated crops, many varieties of the Mangold Wurzel have been obtained by hybridization and other processes in connexion with vegetable physiology, and which, if not produced by art, will often be effected by nature. Though there are many varieties produced in this way, yet there are only a few, comparatively speaking, extensively cultivated, the principal being the Long Red, Long Yellow, and Long Orange, and the Orange, Yellow, and Red Globes. Where the land is deep and heavy, or of a peaty character, the long varieties are best suited, but when of a lighter texture, the Globes are to be preferred.

Having now described the properties of the Long and Globe varieties when considered in relation to soils, the question would naturally suggest itself to the reader—What are the comparative merits of the respective varieties of each sort, as, for instance, the Red, Yellow, and Orange Globes? This is a question very often asked, but it is one to which no very accurate answer can be given, as there are instances where the produce of the Red exceeded that of the others, and so of the Yellow and Orange, even on the same land. These variations must be attributed to many circumstances, such as changes taking place in the soil, climate, manures, &c., which in most instances, cannot be defined. The Orange variety, however, appears to yield the best crops, and adapts itself to the greatest range of soils.* The

* On this (the Albert Model Farm), where the soil is a rich loam, containing a large amount of organic matter (over 14 per cent.), and which is well suited to the growth of Mangolds, carefully conducted experiments for several years past, have shown that the Orange Globe invariably yields the largest and best crops.

same observations may be made with respect to the long varieties, amongst which the Red holds the same position as the Orange amongst the Globe varieties. The Silesian, or Sugar Beet, is another variety, but as its produce is generally much inferior to any of the other sorts, it is scarcely ever cultivated as a direct food for cattle. On the Continent of Europe it is, in some places—as, for instance, France—grown largely for the manufacture of sugar.

With these preliminary observations, nothing now remains but to enter upon its cultivation, and the first subject which presents itself for consideration is the

Preparation of the Soil.—Being a green crop, its place in most rotations is after a corn crop. Assuming then, that the land is in stubble, in autumn, and either thorough-drained or naturally dry, it is to be treated in precisely the same manner as if preparing for any other green crop. The land, whether autumn cleaning is carried out or not (if it be, so much the better), is to receive a deep ploughing in autumn or early winter. As this crop, of all others, requires deep culture, if the field intended for it is has not been recently subsoiled, and the soil and subsoil suited for this operation, it should be performed now, the subsoil plough following in the track of the common plough, and in this way the land is thrown over with a good rough furrow, leaving a large surface to the ameliorating influence of the winter weather. It is a common practice with many farmers to plough in the farm-yard manures intended for the crop, at this season; and if the land be well suited for autumn manuring, it will not only materially forward the spring work, but also the constituents of the manure will be in a very available state at the time the young crop requires them, besides being intimately incorporated with the soil by the subsequent operations performed on it. The land having been ploughed up in a rough state in autumn, or early winter, as before mentioned, may be allowed to remain so till the following spring, when it should receive a harrowing to destroy any seedling weeds that may be springing up. When the sowing season approaches, the land should be cross-ploughed, harrowed, and rolled, and afterwards repeatedly grubbed, harrowed, and rolled till it be reduced to a fine state of tilth. After each harrowing, all weeds should be carefully collected and removed, *and the proper cleaning of the ground, previous to the sowing of all kinds of green crops, cannot be too strongly inculcated.* The number of ploughings, grubbings, &c., necessary to be given in order to obtain the required degree of pulverization, depends on the nature of the soil and its previous treatment; where the soil is naturally loose and friable, a single ploughing with one or two operations of the two-horse grubber, will suffice; but where it is of a more tenacious character, the labor will proportionately increase. When the desired degree of pulverization has been effected, it is to be finally rolled and drilled.

In those districts where the climate is very dry, and the soil also dry and light, and liable to become destitute of a sufficiency of moisture for the growth of the young crop during the summer months, green crops are usually grown on the "flat;" but in this, or any other country possessing a humid atmosphere, and consequently little

danger of the above results, the raised-drill system is to be recommended, and is almost universally adopted.

The land being prepared as above described, drills should be opened, twenty-seven to thirty inches apart, with the double mould board plough, or, if it be not at hand, the common plough must be used. If the manure had not been applied in autumn, it should at least have been carted out during the winter months to some convenient place closely adjoining the field intended for the crop, in order to facilitate the application of it now. When the drills are opened the manure should be immediately deposited in quantity proportionate to the requirements of the land, all lumps well broken and divided, and evenly spread in the bottom of the drills, and at once covered in, and the seed sown. No more drills should be opened at a time than can be manured, covered in, and sown on the same day; for, by an adherence to this principle, a great portion of the fertilizing ingredients of the manure is preserved from loss by exposure to the atmosphere, and the seed being sown in the fresh earth, germination is materially assisted, circumstances on which the secret of successful cultivation in a great measure depends.

Manure.—Of all the manures employed in the production of any crop, farm-yard manure may be considered the staple, but particularly so for the Mangold, of which large crops are raised by its aid alone; good crops have been also grown, where the soil is naturally rich, by the application of guano, vitriolized bones, and other artificial or special manures, or, where a sufficiency of farm-yard manure is not to be had, the deficiency may be made up by the use of extraneous manures, and in such proportion as circumstances may require.*

The farm-yard manure, whether alone or in conjunction, should be very well decomposed, and well mixed by turning, before its application in spring. The quantity applied should be commensurate with the requirements of the soil; but to land of average fertility, 25 tons per statute acre, when applied alone, would be sufficient. If extraneous manures be used alone, 5 cwt. of guano, or 7 cwt. of vitriolized bones, would be a fair application; it is not advisable, however, to raise Mangolds with these manures alone, where farm-yard manure can conveniently be obtained, unless the soil be very rich. A dressing of common salt is highly beneficial to this crop; whether it produces its effects by acting directly on the crop, or indirectly by rendering available some constituents of the manure or soil, or whether they may be attributed to both, is not well known, but it has been ascertained, by chemical analysis, that the ash of both tops and bulbs contains a large amount of common salt.† The quantity of

* On light chalky soils, a mixture of guano, nitrate of soda, and common salt, at the rate of 2 cwt. each per acre, has been found very efficacious in the growth of Mangel Wurzel.—*Nesbit's Agricultural Chemistry*, p. 100.

† Mr. Austen, of Chitworth, near Guilford, who farms on the green sand, has informed me, that with common salt alone on his land, he has succeeded in growing an excellent crop of Mangold Wurzel, by applying it after the plant was up in successive doses of 2 cwt. per acre up to 6 or 8 cwt. Every fresh application appeared to give the crop a new start."—*Johnston's Experimental Agriculture*, p. 63.

common salt contained in the Mangold is so large as to be quite perceptible to the taste in the growing plant, especially the leaf; the amount of sugar contained in the bulb counteracts the taste of the salt in *it*. Though a moderate application of common salt is found to increase the produce, yet too large an application is not attended with similar beneficial results, as appears from experiments made on this farm* during the present year, for the purpose of ascertaining the efficacy of common salt on the Mangold crop, in both large and moderate quantities. The following table is quite sufficient to illustrate this. All the circumstances connected with the cultivation were precisely similar, except in the case of the salt applied.

Variety of Mangold Wurzel.	Quantity of Manure per Statute Acre.		Produce per Statute Acre of Bulbs.	
	Farm-Yard Manure.	Common Salt.		
	Tons.	Cwt.	Tons.	Cwts.
Orange Globe.	18	—	30	10
Do. Do.	18	7	32	6
Do. Do.	18	14	31	17

The best mode of applying the salt is to scatter it over the manure when spread in the bottom of the drill, and by this means there is no danger of its coming into contact with the seed, the vitality of which it would otherwise destroy. When any other of the extraneous manures are used with the farm-yard dung, they may be applied in the same manner, or spread along at the back of the first bout of the plough when the drill is being formed, and is covered in by the second bout, which completes the drills. By this latter mode it will be nearer to the young plant when the seed has vegetated, and, therefore, will be sooner available. There are various modes of applying them, but in all cases care must be taken that they do not come into contact with the seed, as, like the salt, they have all a tendency to destroy its vitality.

In the summer of 1856, Mr. Caird, M. P., had an interesting series of experiments carefully carried out on his farm in Kent, with the view of ascertaining "the kind of manure which, at the least cost, will produce the greatest effect" on the Mangold Wurzel crop.

The following table gives the quantities and cost of the different manures, the produce of each plot, &c.:

* I may be permitted to remark, that the various experiments conducted on the Albert Farm are very correct and perfectly reliable, as great care and attention are exercised in carrying them out; besides, being generally conducted on a pretty large scale, and the *entire* produce weighed, there is no danger of those errors which so frequently occur from the present system so generally adopted for ascertaining the acreable produce.

No of Lots.	Kind and Quantity of Manure per Acre.	Cost per Cubic Yard or Cwt.	Total Cost of Manure per Acre.	Produce per Acre.	
			£ s. d.	Tons.	Cwts.
1	20 cubic yards of Dung, 4 cwt. Guano,	3s. 6d. per yard. 12s. 0d. per cwt.	5 18 0	23	16
2	20 cubic yards of Dung, 4 cwt. Guano, 5 cwt. Salt,	3s. 6d. per yard. 12s. 0d. per cwt. 1s. 6d. "	6 5 6	30	12
3	20 cubic yards of Dung, 1 cwt. Guano, 1 cwt. Superphosphate, 1 cwt. Nitrophosphate, 2 cwt. Salt,	3s. 6d. per yard. 12s. 0d. per cwt. 7s. 0d. " 6s. 6d. " 1s. 6d. "	4 18 6	25	10
4	40 cubic yards of Dung,	3s. 6d. per yard.	7 0 0	21	3
5	2 cwt. Guano, 2 cwt. Superphosphate, 2 cwt. Nitrophosphate, 2 cwt. Salt,	12s. 0d. per cwt. 7s. 0d. " 6s. 6d. " 1s. 6d. "	2 14 0	20	6
6	$7\frac{1}{2}$ cwt. Guano,	12s. 0d. "	4 10 0	17	17
7	12 cwt. Superphosphate,	7s. 0d. "	4 4 0	14	19
8	12 cwt. Nitrophosphate,	6s. 6d. "	3 18 0	15	6
9	$1\frac{1}{3}$ cwt. Guano, $1\frac{1}{3}$ cwt. Superphosphate, $1\frac{1}{3}$ cwt. Nitrophosphate, $1\frac{1}{3}$ cwt. Salt,	12s. 0d. " 7s. 0d. " 6s. 6d. " 1s. 6d. "	1 16 0	19	11
10	5 cwt. Guano,	12s. 0d. "	3 0 0	12	15
11	8 cwt. Superphosphate,	7s. 0d. "	2 16 0	11	18
12	8 cwt. Nitrophosphate,	6s. 6d. "	2 12 0	12	11

Each plot occupied the tenth part of an acre—each containing three rows of roots—the middle one of which was weighed in testing the results. "It will be seen that in every instance where *salt* forms an ingredient of the manure the produce is increased."

Time and Mode of Sowing.—The season for sowing the Mangold Wurzel, in this climate, extends from the middle of April to the middle of May; but the last week in April is considered the best time. If sown too early, the liability of the plants to start to seed during growth, the greatest evil attending their cultivation, is increased; if too late, the crop remains in a backward state during the growing season, and never attains its full perfection, especially if dry weather set in immediately after sowing.

Mr. Miles, M. P., in a paper on the "Cultivation of Mangold Wurzel," in Vol. II. of the *Journal of the Royal Agricultural Society of England*, says:—"The earlier in April your Mangold Wurzel is sown the better; the deeper the tilth the greater probability of a heavy crop." And a recent writer in the same journal (Mr. Paget, of Ruddington Grange, near Nottingham,) states:—"The best seed-time in this locality is, in my opinion, from April 7th to April 10th. It is useless, in general, to sow it earlier, because the temperature is, I think, too low for the germination of the seed. My experiments do not lead me to believe that this comparatively early sowing produces many more 'runners,' and our Summers are too short to admit of unnecessary delay in sowing."—(Vol. XIII. p. 405.)

When, however, through any cause the seed cannot be got in at the proper time, by steeping it in sand or earth moistened with water, or in dilute liquid manure for three or four days, germination will be so far promoted that it will be equivalent to having it, at least, the same time sown. Indeed, many persons recommend the steeping of the seed in all cases, but it is not always safe to do so, for should dry weather occur after sowing, the germination thus artificially produced receives a check which often proves fatal or injurious.

The drills being opened, the manure spread and covered by splitting the drills with the double mould-board plough, the drills thus formed should have their tops slightly levelled by a very light roller, and the seed sown either in a continuous line along the crown of the drills, or deposited in tufts or bunches at the distance apart which the plants are intended to be left at the time of thinning. Owing to the peculiar construction of the pericarp, in which the true seeds are contained, no sowing machine has hitherto been generally employed. If, however, an efficient machine be available, it is, by all means, to be recommended; but in the absence of such, the hand and common hand-hoe, or dibble, are efficient, though rather slow substitutes. Under these circumstances, the method most commonly practised, and which is most to be recommended, is with the hand-hoe to open holes at the required distance apart, and from an inch and a half to two inches in depth; another person follows and drops three or four capsules (or, as they are commonly called, seeds) in each hole, followed by a third, who, with a spade, shovel, rake, or any other convenient implement, draws a sufficiency of mould over the seeds to cover them to a depth proportionate to the texture of the soil, the average being about an inch and a half; but if the soil be of a light nature, and the weather dry, two inches would not be too deep. By this mode of sowing, three careful boys, women, or girls, would sow at least an acre in a day. About 6 lbs. of seed per statute acre is the quantity usually sown, which, if not saved on the farm, should be procured from a respectable and trustworthy seed merchant, in order to ensure what is genuine, as great losses are often sustained by farmers from purchasing cheap but bad seed.*

In forming holes for the seed, the dibble is sometimes employed, which makes from four to six holes at a time by a single pressure of the foot, and is much more expeditious than the hoe; but it has been objected to for two reasons; the first and more important is, that the holes are two small, and the seeds, when put in, fall together, and consequently grow up intertwined with each other, which is very injurious to their early growth, and troublesome at the time of thinning; the other is, that the soil immediately about the seed is consolidated, instead of having that loose texture which is so essential for promoting the growth of the minute and tender roots. These objections may, in a great part, be obviated when the teeth of the dibble

* I have found that sowing too deeply is more to be guarded against than the opposite; an inch is quite sufficient depth for the seed sown early in the month of May. Steeping the seed for 24 hours in water insures a rapid germination, and does not prevent sowing by a drill, if, before sowing, the seed is shaken up slightly in a bag containing a little dry sand. R. S. F.

are made pretty large and the soil light and friable. In sowing the seed, it is well to bear in mind what has been previously said when treating of the varieties as suited to the various classes of soils. In addition to this, it may not be out of place to insert here a table of the produce yielded by the different varieties grown this year on this farm. though, at the same time, similar results are not to be expected in all climates or classes of soils. The description of soil has been alluded to in a note at a preceding part of this essay; the manuring and all things else connected with the cultivation were, in each case, the same, and the following are the results:—

Variety of Mangold Wurzel.	Produce per statute acre.	
	Tons.	Cwts.
Orange Globe, ...	32	6
Deep Orange Globe, ...	29	18
Long Red, ...	28	15
Long Yellow, ...	28	14
Red Globe, ...	26	14
Sugar Beet, ...	30	12

It is surprising to observe the extraordinary produce of the Sugar Beet, being superior to most of the varieties of Mangold, while in ordinary cases it averages about three-fourths the produce of the Mangold, or about 18 tons per acre.

After Culture.—Like the turnip, the after culture of the Mangold Wurzel may be said to consist in *timely and careful thinning, attentive weeding, and keeping the soil in a loose and friable state by means of the drill-grubber, drill-harrow, and hand-hoe.* But, to be more particular, the young seedling plants will appear above ground in about ten days after sowing,—sooner or later, as circumstances are favorable or otherwise; and when sufficiently advanced, the drill-grubber, or, where the land is tolerably loose, the drill-harrow, should be run between the drills to destroy whatever weeds may be growing, and at the same time to assist in tilling the soil. When the plants show a pretty strong leaf, and before there is any danger of injury from allowing them to grow up too strongly, thinning and weeding should commence. If the seed had been sown in a continuous line by machine or otherwise, this operation may be performed by the hand-hoe, taking care to allow the strongest and healthiest plant to remain. The distance apart at which the plants are to be left is determined by the size they are expected to attain. Where the soil is rich and everything favorable to their growth, the greatest space is allowed. When the seed was sown in tufts or bunches, the hand must necessarily be used in thinning, and the distance determined at the time of sowing; from twelve to sixteen inches are usually allowed. In thinning, the plants must not be completely singled out at the first operation; it is better to allow two of the healthiest and strongest to remain together, and at the final thinning, which takes place in about a month afterwards, the more promising plant should be left. This

plan is most necessary to be adopted to prevent the losses which otherwise are likely to happen, by many of the plants starting to seed, and which is materially checked by having the one which presents symptoms of seeding* pulled, and the other left to grow.

As the thinning proceeds, any blanks that may occur should be filled up by transplanting; this is the only case in which the transplanting of Mangolds is to be recommended; and even then, unless the weather be favorable and the operation very carefully performed, the result will not be very successful. Moist weather is the most suitable for this purpose, and the best way to proceed is to open a hole with the spade, where the blank occurs, large enough to receive the whole tuft of plants, with as much clay as can be raised about them. When deposited in the hole, the clump must be carefully firmed, and all the plants then drawn out, except the one intended to be left. This method of transplanting cannot be practised with the thinnings of the crop, as the entire bunch must be used; therefore, at the time of sowing, it is necessary to sow a small plot in some convenient place for the special purpose of transplanting, and by observing the above conditions a fair return may be expected.

When weeds are again beginning to appear, after the first thinning and weeding, the crop should be hand-hoed, and again grubbed and drill-harrowed. In hoeing, great care must be taken that none of the plants be disturbed or in the least degree injured, as the slightest wound inflicted on them in the young state increases during growth, producing a kind of canker in the part, which not only presents a very unsightly appearance, but also greatly injures the value of the bulb, no other of our green crops being so susceptible of injury. In drill-grubbing and harrowing there exists no danger of injury, provided the implements be properly adjusted and carefully employed; but in all the operations great care must be exercised.

Another hand-hoeing and drill-grubbing should be given some time before the crop is so far advanced as to render it unsafe to work amongst it.

In conducting the after culture of the crop, it is well to keep in mind that the number of operations need not be restricted to those above mentioned, for when the soil is a strong one *more* will be required to keep it in a loose state, to admit of the passage of the minute spongioles and delicate fibres in search of food; but on average soils those enumerated are sufficient.

Regarding the propriety of divesting the plants of a portion of their leaves, so much practised in many places, and which yields such a large supply of valuable feeding at a time when other green food is scarce, different opinions are entertained; but there is no disputing the fact that if they be removed too early, while in a succulent and active state, the produce of the growing crop will be diminished, which will appear to be an evident and unavoidable result when we reflect on the important functions performed by the leaves of plants.

* The principal symptoms indicative of a plant likely to run to seed are:—The heart of the tuft of leaves appears high and forward, thus evincing a tendency to produce a seed stalk; there is also an absence of that healthy succulency observable in a better-disposed plant.

On the other hand, if the leaves be not removed till they are observed to droop or flag, showing by their appearance that they are no longer actively employed in performing their special and valuable functions, then they may be removed with safety. The first removal of the leaves may commence towards the middle of September, when those exhibiting the above appearances should be collected, and a fresh supply for a second gathering will be ready towards the middle of October. By this means a large quantity of excellent cattle-feeding may be obtained, which would otherwise be either lost or come in at a period when it would not be of half its value, other feeding being then plenty. The value of Mangold leaves as a food for milch cows stands high amongst green fodder, as tested by a series of carefully-conducted experiments made at this (the Albert) Institution, of which the following table shows the results :—

No.	Date of Experiment.	Kind of Feeding.	Butter produced by 40 quarts of Milk.	
	1857.		Lbs.	Ozs.
1	4th May.	Italian Rye Grass alone, . .	3	5
2	5th Sept.	Italian Rye Grass & Pasture,	3	13
3	28th Sept.	Mangold Leaves and Pasture,	3	14
4	6th Oct.	*Mangold Leaves alone*, . . .	4	

The mangold leaves are very much relished by milch cattle, and from six to eight stones* per day in alternate feeds, with hay or straw, is a good allowance for an ordinary sized beast.

"The leaves of the plant," remarks Professor Wilson, "also appear to possess a far higher value, both as a *feeding* and as a *manuring* substance, than we are accustomed to assign to them. Boussingault (Annales de Chimie) gives us an organic analysis of the roots and the leaves, of the plants; a comparison between their respective compositions will be very much in favor of the leaves for the purposes just mentioned. The substances were dried necessarily previous to their analysis. Their proportions of water were about the same, and their elementary composition was as follows :—

	Root.	Root.	Leaves.
Carbon, ...	42.75	42.93	38.1
Hydrogen, ...	5.77	5.94	5.1
Oxygen, ...	43.58	43.23	30.8
Nitrogen, ...	1.66	1.66	4.5
Ash, ...	6.24	6.24	21.5

thus showing that, in a chemical point of view, the leaves were *three times as valuable as the same weight of roots would be.*"—*Journal of the Royal Agricultural Society of England*, Vol. XIII. p. 160.

* A stone is 14 lbs. weight.

Storing.—About the beginning of November* the crop will have arrived at maturity, and then no time should be lost in getting it into the farm-yard, as should frost occur, the bulbs are liable to be injured severely. The opportunity of dry weather should, if possible, be seized upon for this purpose, even should it occur in the end of October, for it is only in dry weather this can be done without injury to the land, whilst the crop will thus be taken up in the best state for securing its safe keeping, even to a late period of the following season. Having selected a convenient place for storing the bulbs, the operations of pulling, topping, carting, &c., should commence, and proceed with all possible despatch. The bulbs growing in every four drills should be placed together in the hollow space between the two middle ones, and by this means the carts can pass between two rows, and be filled from both at the same time; the leaves may be thrown in heaps also, in such a manner as not to interfere with the carting. In topping, *i. e.*, taking off the leaves, a sharp knife or sickle may be used, but the utmost caution must be taken that the tops be not severed so close to the bulb as to wound it, as should it happen to be cut, the juice or sap exudes through the wound, and not only is a great part of its nutritive properties thus lost, but it is also very liable to decay. To avoid this danger, many persons have the tops twisted off with the hand, which performs the work very expeditiously. No more should be pulled and topped in the field than can be carted in and stored the same day, for should frost occur over night the denuded bulbs will suffer severely, while if standing and protected by their broad leaves, its effects will be greatly lessened. If any unavoidably happen to be left out, they may be kept safe by making into heaps and covering them with the leaves. Should any, however, be frozen, by unavoidable exposure, they should be kept separate, and consumed as soon as possible, as they will not keep for any length of time.

In selecting a place for storing, if a wall with a northern aspect and dry situation be at hand, nothing better can be desired than to store them up against it neatly, making the heap about six feet wide at the base, and sloping up against the wall to the height of six or seven feet. When this method of storing is not convenient, the bulbs may be built into roof-shaped heaps, about six feet in width at the base, and five feet in height, in a dry place. Another very good way to store them, is to build two dry stone walls, parallel to each other, sufficiently distant to allow a cart to pass between them, about four feet high, and of any required length. Hurdles may be substituted for stone walls, and enclosures made by brush-wood, &c., when found more convenient. Into these enclosed spaces the bulbs are put and piled up, terminating in a ridge. This latter method of storing is a good means of economising space; and if it be adopted, the dry stone walls, (if hurdles, &c., be not used in their stead), require to be plas-

* The harvesting of the beet in Massachusetts should commence a month earlier, say in the first and second weeks of October, and stored before the other root crops. This happens to be fortunately the most convenient order for harvesting with respect to future use, as the beet root is not wanted until after the turnip, carrot, and other root crops are exhausted. R. S. F.

tered or dashed with mortar, to prevent frost from entering the crevices. Whatever mode of storing is adopted, the same great object is to be kept in view, viz :—the safety of the crop by preserving it from frost and wet, by carefully thatching as quickly as the heap is made, and making provision for the removal of all wetness caused by rain or otherwise. Being carefully stored, thatched, and kept dry, the mangold may be preserved in a sound state till midsummer, if required, and even longer, with their feeding properties little impaired,—especially if the heap be turned over in spring, and any young shoots rubbed off, besides removing any decayed roots.

Produce.—The produce varies with the climate, soil, season, manuring, care bestowed on cultivation, &c. Where all these are favorable, over forty tons per acre have been obtained; but twenty to twenty-five tons may be considered as the average, and twenty-five to thirty tons may be reckoned a good crop.

The Mangold Wurzel is less variable in its produce than the turnip, not being so liable to casualties during its growth; the principal ones to which the former are liable, are the occurrence of occasional blanks owing to the failure of the seed in germinating, vitality having been destroyed, perhaps before sowing, or afterwards by some accident; but these will, indeed, be few, if care be taken in procuring genuine seed, sowing it in favorable weather, and not at too great a depth; if these blanks be filled up by transplanting, little loss will be sustained. Starting to seed is the greatest evil attending its cultivation, which, however, may be greatly checked by taking the precaution described in thinning. Any plant that may afterwards start should have the seed stalk within broken, or cut off, and this operation repeated, if necessary. By this means, those plants which would otherwise be worthless, may be made to produce tolerable bulbs.

Most economical mode of Consumption.—On all farms where the Mangold Wurzel is grown, there is a sufficiency of Swedes and other turnips raised for food for the cattle during the early part of winter, mangolds not being suited for early use, as they contain a peculiar acrid principle, when freshly taken out of the ground, which exercises an injurious effect on cattle, producing a very laxative state of the bowels, but which, in the course of a couple of months, either entirely disappears, or undergoes such a change as renders their use harmless; and cattle are thus found to thrive better on them when kept over till towards spring.

The best way, therefore, is to consume the Aberdeen and other soft turnips first, then the Swedes, which should at least hold out till January or February, when the Mangold will be ready for use. The change from the turnips to Mangold should be gradual, whether the animals be fattening, milking, or store cattle, in order to prevent the latter producing those laxative effects above alluded to. Hay or straw should be given to the cattle, between each feed of Mangolds. The bulbs may be sliced or pulped, but they are frequently given whole.

Value as a Feeding Stuff.—Every animal on the farm has a great relish for Mangold Wurzel, and thrives remarkably well on it. They are excellent food for milch cows, producing a large flow of milk and

not communicating any disagreeable flavor to it or the butter made from it. Steamed for pigs, they form, with the addition of a small portion of meal, valuable feeding. Horses also relish them, and small farmers, who cannot afford oats to their horses, may keep them in excellent condition during the winter and spring months fed on boiled mangolds mixed with a little bran or bruised oats, in addition to hay or oatstraw. About six stones of mangold, with intermediate feeds of hay or straw, is a fair day's allowance for an ordinary sized cow.

It appears to me desirable to give the following extracts from the opinions recorded on the value of Mangold as food for fattening cattle, milch cows, and other animals, by gentlemen distinguished by their practical and scientific attainments:—

"The Mangold is known to be good for all animals giving milk. But it also appears, from a remarkable experiment of Lord Spencer, that this root is good for fattening also. The two beasts put up by him made even more progress when fed alternately upon mangold than upon turnips, and he considers the result to be decisive."—*Mr. Pusey (Journal of the Royal Agricultural Society of England*, Vol. III. p. 201).

"All stock like it, even horses thrive upon it; it is cheap food, and may be given to cattle in autumn if chaff is but admixed with it to counteract its laxative effect."—*Mr. Bond (Farmer's Magazine).*

"This root is a very valuable food for cattle, is much relished by them, fattens well, and gives a rich milk."—*Professor Johnston (Highland Society's Journal*, p. 607).

"Its use is principally as food for milch cattle, for which it is superior to all other kinds of green crop, yet its culture has not extended by any means in proportion to its value."—*Professor Murphy (Agricultural Instructor*, p. 52).

"Field-beet is the best of the root class of vegetables for a cow giving milk."—*Martin Doyle.*

"My experience of the value of this root has been so long and so uniform that I have no hesitation in calling upon my brother farmers, who are similarly situated as to their climate and soil, to participate in its advantages."—*Mr. Paget (Journal of the Royal Agricultural Society of England*, Vol. XVII. p. 408).

"Experiments have been made to test the value of Mangold Wurzel compared with Swede turnips in the fattening of cattle. The experiments which have come under my knowledge—the estimate of the increase of weight of the animals experimented upon having been made from external measurement, and not in scales—do not appear to me to be decisive, but only indicative of considerable superiority in the fattening properties of Mangold Wurzel over the Swedes."—*Mr. Colman (European Agriculture*, p. 260.)

In the interesting experiments in fattening cattle on different descriptions of food, which were carried out on Colonel M'Douall's farm in Wigtonshire, and the results of which are recorded by him in the *Journal of the Royal Agricultural Society of England*, (Vol. XIII. Part I.) the valuable feeding properties of Mangold are clearly established, but in that climate and soil, as stated in a preceding

part of this essay, a considerably larger acreable produce of Swedes can be obtained. The following note was appended by the late Mr. Pusey to Colonel M'Douall's observations on the relative merits of Mangolds and Swedes. "There is no doubt that in this part of England, (Berkshire, for instance,) it is as easy to grow thirty tons of Mangold as it is to grow twenty tons of Swedes to the acre. Assuming Colonel M'Douall's results to be such as would ordinarily take place, the superior profits of Mangolds over Swedes is very great, for the money returns will stand as follows:—

Mangold, ...	£13	2	6	per acre.
Swedes, ...	6	5	0	"

The Money return from the Mangold therefore appears to be more than double that from the Swede. There is also the great advantage of the land being clear for the timely sowing of barley, by feeding stock on Mangold, which, of course, has been stored, instead of keeping the sheep on Swedes run to seed in April, while the seed time for barley is passing or gone. This experiment strongly confirms those of the late Lord Spencer, which appeared some years since in this Journal. The laxative tendency of Mangold is easily, as in this case counteracted by the accompaniment of bean meal."

Dr. Voelcker has recently drawn attention to the singular circumstance that although the Mangold is "justly esteemed on account of its fattening properties when given to beasts, yet it appears to be about the worst description of roots that can be given to sheep." And again he says, "On further inquiry I have learned that this observation is confirmed by many practical feeders. Mangolds, therefore, ought not to be given to sheep."*

The following table shows the quantity of milk yielded by cows fed at the Albert Farm on mangolds, as compared with that given by the same cows when fed on Swedish turnips. The turnips and mangolds were prepared in the same manner (washed and sliced), and in both instances the cattle were out for water and exercise an hour daily; and their treatment in every other respect was precisely similar:—

Date. 1858.	No. of Cows milked.	Quantity of food consumed by each cow daily.	Quantity of milk yielded.	Total.	Increase.	Daily Increase.
			gals.	gals.	gals.	1s
Feb. 15.	23	$6\frac{1}{2}$ st. Swedish Turnips, Oat Straw, *ad libitum.*	$28\frac{1}{2}$			
" 16.	23	Do. Do.	29			
" 26.	23	$6\frac{1}{2}$ st. Mangolds, Oat Straw, *ad libitum.*	31	$57\frac{1}{2}$		
" 27.	23	Do. Do.	32	63	$5\frac{1}{2}$	$2\frac{3}{4}$

* "*On the Chemistry of Food,*" p. 30.

The change of food from Swedes to mangold took place on the 17th, and with the view of preventing the secretion of milk, either as regards quantity or quality, being influenced by the former mode of feeding, the second experiment was not made until the 26th. As fully three-fourths of the cows were heavy in calf, and the quantity of milk yielded by them naturally on the decrease, the period which elapsed between the trials on the 15th and 16th and those on the 26th and 27th would, to some extent, lessen the result in favor of the mangolds.

The annexed table gives the results of an experiment recently made at the Albert Farm, by churning some of the whole milk* yielded by the cows when fed on mangolds and oat straw :—

Quantity of milk churned.	Butter produced.	Cream yielded.	Quantity of cream to produce 1lb. Butter.	Quantity of milk to produce 1 qt. Cream.	Butter produced by 1 qt. Cream.	Quantity of milk to produce 1 lb. Butter.
Quarts.	lbs. ozs.	Quarts.	Quarts.	Quarts.	ozs.	Quarts.
40	4 1½	4 2-5	1 1-15	9 1-11	15	10 (nearly.)

Composition of Mangold Wurzel.—Dr. Voelcker, in his very valuable and recently published work, "*The Chemistry of Food,*" (p. 28,) says: "Mangolds have been analyzed by Professors Way, Johnston, Wolff, and myself; but as it will be of no practical utility to mention these various analyses in detail, I shall leave them unnoticed, and state at once the average composition of good mangold wurzel, which has been calculated from 13 published analyses of this root :—

	In Natural State.	Calculated Dry.
Water, ...	87.78	--
Flesh-forming Constituents, ...	1.54	12.60
Woody Fibre, ...	1.12	9.16
Sugar, ...	6.10	49.91
Pectin, Gum, &c.	2.50	20.45
Inorganic matters (ash)	0.96	7.88
	100.00	100.00

"Mangolds, it will be observed, contain on an average as much water and dry matters as carrots, and on the whole, are almost as nutricious as carrots, if they are given to fattening beasts after a few months keeping. . . . . The superior fattening value of stored mangolds, when compared with the fresh root, may be due to the

* The Lactometer indicated 11 per cent. of cream.

absence of this acrid principle in old roots, but doubtless it must be attributed also to the larger amount of sugar which stored mangolds contain. An examination of fresh and old mangolds, has shown me that, on keeping, the pectin in the fresh roots is gradually formed into sugar, which appears to be more conducive to the rapid fattening of beasts than pectin. For these reasons mangold wurzel ought not to be supplied to animals before the latter end of December or the beginning of January."

According to the analyses of Professor Way, and Mr. Ogston, of Long Red and Yellow Globe, mangolds gave the following results (in 100 parts):—

	Long Red.		Yellow Globe.	
	Bulb.	Leaf.	Bulb.	Leaf.
Potash, ...	29.08	27.53	23.54	8.34
Soda, ...	19.05	5.83	19.08	12.21
Lime, ...	2.17	9.06	1.78	8.72
Magnesia, ...	2.79	3.10	1.75	9.84
Peroxide of Iron, . . .	0.56	0.48	0.74	1.46
Silicia, ...	4.11	1.35	2.22	2.35
Sulphuric Acid, . . .	3.31	6.26	3.68	6.54
Phosphoric Acid, . . .	3.11	4.39	4.49	5.89
Carbonic Acid, . . .	21.61	6.11	18.14	6.92
Chloride of Sodium (com. Salt),	14.18	29.85	24.54	37.66
Total, ...	99.94	99.96	99.96	99.95
Per centage of Ash. . . .	1.60	1.91	1.02	1.40

It may be observed by an inspection of the foregoing table, that the tops or leaves are richer in phosphoric acid, lime, and magnesia, than the bulbs, but contain less of the alkaline carbonates, *i. e.*, carbonates of potash, soda, &c. It will also be seen that both tops and bulbs contain a large per centage of common salt, which accounts for the beneficial results arising from its application to the crop.

Professor Johnston says, "the dry matter of the mangold wurzel and the carrot resembles in composition that of the turnip. Some varieties of these roots contain still more sugar. They likewise surpass the turnip in their per centage of dry nutritive matter. This in the three roots, is nearly as follows:—

	Turnip.	Mangold.	Carrot.
Dry nutritive matter,. . . .	8 to 12	15	14 to 20
Water, ...	92 to 88	85	86 to 80
	100	100	100

Hence the generally more nutritive quality of the two latter roots, weight for weight.—(*Elements of Agricultural Chemistry*, p. 326.)

[NO. 2.
NEW SERIES.]

ON

HORSESHOEING.

BY

WILLIAM MILES.

REPRINTED, FOR GENERAL DISTRIBUTION, FROM THE JOURNAL OF THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND. VOL. 18, P. 270.

BOSTON:
1858.
J. H. EASTBURN'S PRESS.

HORSESHOEING.

Although the subject of this paper may not legitimately come under the head of agriculture, it is nevertheless so intimately connected with the interests of the agriculturist, and has been so wofully neglected by him, that I may perhaps be excused for attempting to arouse him to a sense of its importance in a pecuniary point of view. Horses are essential to the carrying on of his pursuits, he cannot possibly do without them, and a lame one is a very serious and expensive incumbrance to him.

My object, therefore, shall be to show him and others how they may insure to themselves a much larger amount of good and efficient service from their horses than has hitherto been obtained from them, at the small cost of a little attention to the mode in which they are shod, and the general treatment of their feet in the stable. It is too much the habit to consider that shoeing has accomplished all that can be expected of it, if the shoes are only firm on the horse's feet when his master requires his services; whether they are tight and pinch him, or are easy and comfortable to him, are matters that are seldom considered, so long as he can go at all, and contrive to keep himself on his legs, and not diminish his marketable value by tumbling down and breaking his knees; all the pain he endures passes unheeded, except by the poor brute himself, and until he becomes positively lame and useless he receives no sympathy or care from those whose bounden duty it was by timely attention to have spared him. "No foot no horse" is a truth that I doubt not has been realized to many of my readers, when, in the expectation of an agreeable ride either on business or pleasure, they have found their horse emerge from the stable, marking time with his head at every step with the precision of a drill-sergeant.

The first thing that occurs to every one on such occasions is to travel yesterday's journey over again in the mind's eye, in the hope of discovering some particular hole in the road, or some particular stone that must have caused the unlooked for and unexpected calamity; the bare possibility of its being the gradually developed result of long continued bad shoeing, and bad treatment in the stable, of course never suggests itself, because the horse has always been treated as other horses are treated, and therefore those things can have nothing whatever to do with it; and this would be considered a sufficient and satisfactory answer to any one who had the temerity to surmise such a cause. I will nevertheless venture to assert, that in nine hundred and ninety-nine cases of foot-lameness out of every thousand, bad shoeing and bad stabling have had more to do with it, than the supposed accident that causes the horse to "drop his head to it," and thereby show that the culminating point had at last been reached, and that he is indisputably lame.

Foot-lameness is a very insidious affair, particularly that most painful and common form of it, navicular lameness. It steals on very gradually, and for the most part unobserved by all but the unfortunate horse; he, poor beast, notes its every stage, and if those who look after him, and those who employ him, would only attend to the indications he gives them, they would know as much about it as he does, excepting the pain. His courage enables him to bear a good deal without much flinching, nevertheless he soon shows to a close observer that mischief is brewing; the first indication he gives is the straightening of the pastern bone, so as to place the weight of the leg more on the coffin bone, and less on the navicular bone; then, as time goes on, and the pain increases, he relaxes the fetlock joint, and bears less weight on the foot altogether; still there is not much in his mode of standing to attract the attention of a casual observer; his next plan for obtaining relief is to advance the foot slightly, so as to bring the toe of the lame foot a little in front of the toe of the opposite foot, whereby he removes it in some degree from the base which supports his weight.

All this may have been going on for months, and no one have observed it, until at last he can bear the pain no longer, and he thrusts his foot fairly out in front of him in undisguised "pointing;" nevertheless he contrives, when he is at work, by shortening his stride and stepping a little quicker, to conceal the lameness; and the groom and his master become in time so accustomed to his posture in the stable, that they look upon it as a mere trick, and say, "it is all nothing, he always stands so when at rest:" the latter may be true, but the former is something more than doubtful.

Some horses are unquestionably given to tricks, but no horse ever indulges in a trick which compels him to stand almost constantly on two legs instead of four; the pain and inconvenience of such a proceeding would soon induce him to relinquish it as a matter of amusement. Before he can point a fore foot he is obliged to dispense with the support of the opposite hind leg, which he does by relaxing the muscles, lowering the hip, bending the joints, and resting the limb on the toe; he then has to divide his weight as equally as he can between the other hind leg and the opposite fore leg, and having done this he raises the lame foot and deposits it sufficiently forward to insure its exemption from sustaining any portion of his weight; he then lowers his head and neck with a view of still further diminishing the weight on his feet, and presents altogether such a picture of misery, that it would require a very lively imagination in the beholder to suppose the horse is merely indulging himself in an agreeable trick.

The horse's foot is made up of a variety of textures so elaborately and beautifully combined as to form one complicated but perfect spring, and unless that spring is permitted to have constant freedom of action, it very soon gets out of order, the more delicate parts lose their elasticity, and the power of expansion, which is so essential to the soundness of the foot, becomes first diminished, and ultimately destroyed, whereby the horse is soon rendered useless. I take it there are few persons who will dispute the expansion of the horse's

foot, but whatever the general theory about it may be, the all but universal practice is to treat it as an inelastic solid, whose chief use is to pound MacAdamized roads.

The horse in a state of nature roams about at will with his feet unfettered, and they take no harm, simply because he is permitted to look where he is going, pick his way over difficult ground, and direct his own pace; but as soon as he enters the service of man these valuable privileges and safeguards are withdrawn, and the various uses to which he is put, and the rapid rate at which he is required to travel over all sorts of roads, call for some efficient protection to his feet, and it is not only our duty, in return for the important services he renders, to see that it is applied in the manner the least detrimental to him, but it is our interest to do so in anticipation of the lengthened service it will insure to us. If horses were always properly shod, and properly stabled, they would repay the care thus bestowed on them by the increased length of efficient service they would perform. When a horse has worked seven or eight years it is no uncommon thing to hear his master say, "he owes me nothing," which may be perfectly true, considering the treatment he has received; but if he had been properly treated during the time he would be still some eight or ten years of active service in his master's debt.

The horse is a much longer lived animal than people generally suppose him to be; but the prevalent mistake as to the length of his natural life may be attributed to two opposite causes: First, the very large number that are known to die at an early age—victims, it may truly be said, of over-work, bad management, and cruel treatment; and next, the great difficulty there always is of ascertaining the real age of a horse when the mark has disappeared from his mouth. Horses are marketable commodities, and very few persons are disposed to lessen their value, by recording very accurately the number of years that pass over their heads, after the mark is gone; the consequence is, that they remain *about* nine or ten years old so long, that their actual age becomes buried in oblivion, and at last no one really does know how old they are. Many a man at this moment is using a horse, perhaps some eight or ten years older than he thinks he is. I remember many years ago purchasing an active showy horse, said to be about the mysterious age of other people's horses, and there was nothing in his appearance or powers of work to indicate greater age; but on tracing his history I discovered that he was twenty-nine years old, and the sire of a very large progeny. Now, if I had not taken the trouble to trace him back I should never have known within fifteen or sixteen years how old he really was.

I have, at different times, met with four horses who were all known to be over forty years old, and were still at work; one of them was shot at the age of forty-five, not because he was incapable of further work, but because his master saw the servant ill use him. But, perhaps without taxing my memory for further facts, those supplied by my own stable in November of last year may sufficiently illustrate my position, that the natural life of a horse is longer than it is generally supposed to be. I had at that time six horses in my stable whose combined ages amounted to one hundred and forty-five years

and five of them are still there, with clean legs and hoofs looking like colts' hoofs. The sixth I had destroyed last December at the age of twenty-six. When I purchased him nineteen years ago he had incipient navicular disease, but I contrived by shoeing and stable management to keep it at bay all that time.

The patriarch of the lot, who was bred only five miles from Exeter, has just completed his fortieth year; his early history does not redound to his credit; he was a very unruly, unmanageable brute, and was perpetually changing masters for running away and kicking carriages to pieces; two hackney men in succession tried him, but were obliged to part with him; at length he was handed over to the tender mercies of a commercial traveller, whose long journeys through Devon and Cornwall, after a few years, subdued him, and he became a very useful horse, and at the age of fourteen was sold to a friend of mine, from whom I purchased him exactly twenty years ago. He is a high stepper and remarkably handsome, and if you do not look in his mouth his general appearance would pass muster for nine or ten years old; he is perfectly quiet out of the stable, but he had been so teazed and worried all his life, until he came into my hands, that even now he will not permit a stranger to enter his box alone. The next in seniority is twenty-nine years old, and is the best hack I ever rode. Seventeen years ago, the smith who usually shod him declared his feet to be so far gone that he could shoe him no longer; and he was on the point of being shot, as "used up," and "quite done for," when I came to the rescue, and accepted him as a present, with the view of trying what I could do to put him on his feet again, and the result of my trial has been seventeen years of very efficient service.

There is no speciality attending the history of the other three: one is twenty-one years old, and has been in my possession sixteen years; another is sixteen years old, and has been in my possession nine years; and the last of the six above-named horses is thirteen years old, and I have had him eight years. The horse I purchased to replace the one that was shot in December is seven years old, and was in hard work up to the time I bought him, and although he has been only five months in my possession, his feet and legs have wonderfully improved, and begin to resemble those of my other horses.

If I were asked to account for my horses' legs and feet being in better order than those of my neighbors, I should attribute it to the four following circumstances: First, that they are all shod with few nails, so placed in the shoe as to permit the foot to expand every time they move; secondly, that they all live in boxes instead of stalls, and can move whenever they please; thirdly, that they have two hours daily walking exercise when they are not at work; and fourthly, that I have not a head-stall or rack-chain in my stable: these four circumstances comprehend the whole mystery of keeping horses' legs fine, and their feet in sound working condition up to a good old age. Another case occurs to me, where the same result has followed similar treatment in a mare I purchased for a friend twelve years ago; she was twelve years old when I bought her, and had done a great deal of work; she has ever since been shod by the smiths who shoe my horses, has lived in a loose box, is never tied up, and continues to

do her work as pleasantly as ever she did. I may mention, in confirmation of the fact, that my horses are never tied up; that a short time ago a veterinary surgeon, who had occasion to apply a liniment to the throat of one of them, asked for a halter, and learnt to his astonishment that there was not one in the stable; we substituted a watering bridle, and afterwards fastened the horse to the pillar reins, to prevent his rubbing his neck, instead of adopting the usual plan of tying him short by the head to the wall: a watering bridle is at all times preferable to a halter either for commanding or leading a horse.

I am often assured, when talking of shoeing, that it is quite impossible to persuade country smiths to listen for a moment to any new suggestion, or to adopt any new plan, that they are an obstinate prejudiced race, and nothing can induce them to relinquish any of their old notions. I can only say in reply, that this does not at all accord with my experience of them as a class; on the contrary, I have found them, for the most part, to be hard-working, painstaking men, evincing great interest in their work, and anxious to do it as well as they could. I do not mean to say that there are no exceptions, because I know there are; but the exceptions do not disprove the rule.

Before we consent to condemn them in a body let us see how the matter really stands between them and their employers, who accuse them of prejudice and obstinacy. We must not forget that they have been accustomed from the period of their apprenticeship to shoe horses in one particular manner, which has hitherto given satisfaction, and, as far as they know to the contrary, they have never lamed a horse.

We must not be surprised, if, under these circumstances, they should show great reluctance to relinquish plans which long habit has rendered almost second nature to them, or if they require to be thoroughly convinced of the practicability and superiority of a new plan, before they consent to give up the old one; and as it is much more difficult to efface what has been already learnt than to teach what is new, he who undertakes to become an instructor, must at least be sufficiently master of his subject to be able to point out pretty clearly the advantages of the plan he proposes over that which he desires to alter; to which end he must acquaint himself with the details of his plan before he ventures into the forge, for an intelligent smith will make a very accurate estimate of his fitness to teach before he has been many minutes there; and I have no doubt but much of the obstinacy and perversity one hears of may be traced to the smith's having received impracticable, if not impossible, directions. And surely it is not very unreasonable in him to object to carry out details which he does not comprehend, and which he strongly suspects his instructor is not very clear about, when he knows full well that he would decline to share the blame with him, in case the experiment should fail, and the horse cast a shoe.

I have been sometimes surprised at the readiness with which smiths have yielded their opinion to me, as soon as they found that I really knew what I was talking about, and that I could not only give them

directions, but show them exactly how to carry them out in detail, and, if I had only possessed the brawny arm which is necessary for such a purpose, that I could have forged the shoe and fitted it to the foot. They all feel that horseshoeing is open to improvement, and as a class they are anxious for information that they can depend on, but they are naturally very shy of relinquishing plans which they have been long accustomed to for others which they do not comprehend; but any gentleman who will take the trouble to acquaint himself with the principle and details of the plan which I advocate, will very soon become a welcome visitor at the forge, and while he is improving the condition of his own horses' feet, he will find that he is indoctrinating the whole district to the great benefit of his neighbors; for although they will not take trouble themselves, they are soon ready to avail themselves of the trouble taken by others, and will send their horses to the man who can shoe them best, and that causes the other smiths to look about them and change their plans.

A few years ago I rented a house for the summer near to a country village, and was very soon waited on by the smith with specimens of his shoes, and a foot shod in his very best manner; and as examples of careful finish they were very pretty things to look at; but when I descended from the ornamental to the useful, and began to point out the defects one after the other, he looked astonished, and not very well pleased; he was, however, somewhat consoled by my telling him that I would have one of my horses brought to his forge on the following morning, and then I would show him what I meant. I kept my word, and finding that he entered with interest into my views, and tried his best to understand and carry them out, I took some trouble with him, and frequently looked in and directed him at his work. One day I found him turning store-shoes of a better form than any I had yet seen in his forge, and observing to him that they were more like what I meant, he said, "Oh yes, I have got it now, Sir; my shoes were all too short to fit as they ought to do;" and pointing to some that were hanging against the wall, he added, "before you came here I used to feel very proud of those shoes, but now it makes me ill to look at them, and I don't think I could ever make one like them again." He had become a really good shoer, and understood how to fit a shoe properly, and I think he would have found it a difficult job to fall back on his old pattern again. His fame soon spread, and he obtained the shoeing of all the gentlemen's horses for several miles around him. Similar results have followed in other instances where I have bestowed a little trouble, and I must say that I have invariably received civility and attention at the time and on many occasions expressions of great gratitude afterwards.

Many persons have been deterred from interfering with the smith, because, as they have told me, they knew nothing whatever about the anatomy or physiology of the horse's foot, and had neither the time nor the inclination to study it; but such knowledge is not at all necessary to a thorough acquaintance with the principle and practice of horseshoeing; if it were, they might well be excused for not attempting it: all that is really required of them is to take one anatomical and one physiological fact on trust, and believe that the horse's

hoof is lined by a very sensitive membrane, which must on no account ever be wounded, and that the hoof itself is elastic, and expands when the weight of the horse is thrown on the foot, and contracts when it is taken off again; all the rest is purely mechanical and merely calls for the exercise of a little thought and patience to understand the principle and apply it.

But before I enter on details let me dispose of one subject that has given rise to much unnecessary thought and controversy—I mean the very generally entertained notion, that particular kinds of roads and certain kinds of work call for separate and distinct methods of shoeing—which has greatly complicated and mystified a very simple and straightforward matter: the truth is, that no system of shoeing is worth one moment's thought or consideration that will not answer equally well in every description of ground, and for every kind of work.

It has been supposed that the hunter forms a special exception, but the experience of a large number of gentlemen in various parts of the country during the last ten years has entirely dispelled the fallacy, and proved beyond dispute that the torture inflicted on hunters by nailing the shoes from heel to heel, with a view of keeping them on their feet, is an unnecessary act of cruelty perpetrated to support the notion, that deep ground would pull the shoes off unless they were secured by extra nails: but if a shoe fits the foot as it ought to do, and is perfectly fastened to it by five nails, nothing short of a violent wrench from the smith's pincers can remove it. This has been proved in numberless instances, not only by myself but by others in various hunting countries, who have kindly communicated to me the result of their experience after a fair trial of the plan of shoeing and general treatment of the horse's foot, which I recommended in a work I published some years ago on that subject, and which an officer of Prussian Hussars desired my permission to translate and publish in German; and he writes me that he and several of his brother officers have had their horses shod as I have directed, and that they never lost a shoe. It would be a useless waste of time to go over all the proofs again; nevertheless, as I am now writing for agricultural readers, it is desirable that I should be able to show to them, beyond the possibility of doubt, that the mode of shoeing which I recommend will stand the test of the deep clay ground their horses are sometimes called upon to work in; and in order to qualify myself to speak with authority in this matter, I have lately instituted an experiment which I think will carry conviction to the mind of the most sceptical.

The two subjects of my experiment were horses employed in drawing materials for a large public building in course of erection in a deep clay meadow, and I chose the particular time for making the experiment, because the unusual quantity of rain that had fallen during the preceding six weeks had rendered the ground, both in the meadow and at the quarry from which the stone was drawn, as deep and clinging as it is possible to conceive ground to be. One of the horses was the property of the builder, and the other belonged to the person who had contracted to draw the stone from the quarry, and whose horses are chiefly employed in drawing either timber or stone,

than which no work can be more trying to the security of horses' shoes at such a season, and in such a county as Devon. I was present at the shoeing of these horses, and saw them both shod with five nails only in each fore shoe and a clip at the toe. The shoes were plain waggon-horse shoes, with stamped holes and no fullering. The builder's horse was a fair average cart horse 15 hands 3½ inches high, and the shoes that were put on him weighed 1 lb. 14 ozs. each. The contractor's horse was a heavy waggon horse 16 hands and an inch high; and I could scarcely have found a fairer subject for my experiment: he has remarkably weak feet, with hoofs full of what smiths call shaky places, and he is so hot and impetuous in his work that the driver never can prevent him doing much more than his share. I had one of his shoes measured and weighed just before it was nailed on, and found it to be 6 inches across from side to side at the quarters, and 7 inches from toe to heel, and it weighed exactly 2½ lbs., so that each nail in his shoe had to retain half a pound weight of iron and hold it to his foot.

I visited both the horses at the end of a fortnight, and found their shoes not only safe on their feet, but not a clench had risen, neither had either of their shoes shifted in the smallest degree. I was fortunate enough to meet the larger horse coming from the quarry with a load of stone, and anything more satisfactory to me, as regarded my experiment, or less satisfactory to the poor brute, I cannot conceive; for he was literally plastered up to the knees and hocks with a thick layer of red clay, and the spokes of the wheels were in a like condition up to the nave, showing pretty clearly the kind of ground he had had to deal with, and the sort of test that had been applied to the security of his shoes.

At the expiration of another fortnight I again examined the shoes of both the horses, and finding those of the larger horse completely worn out, I had them taken off and replaced by new ones fastened by five nails; the shoes of the other horse not being worn out, I permitted him to carry them another week, and then, considering he had worn them long enough for my purpose, I had him reshod; but wishing to make my experiment as perfect as I could, I had two of the nails omitted, and shod him with *three* nails only in each fore shoe; and at the end of four weeks I saw him at work with his shoes safe on his feet. I do not mention this fact with the view of trying to persuade others to shoe their horses with only *three* nails, although I have not had more than three nails in a fore shoe of any horse belonging to me for several years past, neither do I intend to increase the number: I merely record the fact to show that no one need fear to trust their horses' shoes to the keeping of *five* nails.

The result of the numberless experiments I have made at various times, on all sorts of horses doing every kind of work, is, that there is but one principle to be observed in horseshoeing, which will admit of no variation or compromise: *the shoe must fit the foot, whatever the shape of the foot may happen to be, and it must be nailed to the hoof in such a manner as will permit the foot to expand to the weight of the horse;* this latter condition will be best complied with by placing three nails in the outer limb of the shoe, and two in the inner limb

between the toe and the commencement of the inner quarter; a larger number than five nails can never be required in any shoe of any size, or under any circumstances, excepting for the sole purpose of counteracting defective and clumsy fitting. I will now proceed to describe, as shortly as I can, the details of the plan I recommend; and if it should appear, to those who have done me the honor to read what I have already published, that I have repeated myself, I can only answer that the details of a fixed plan will admit of no variation in substance, and very little in words.

The first thing requiring attention is the removal of the old shoes, which should be done with much more care than is usually bestowed on it, and without any of that violent wrenching from side to side one too often witnesses, whereby the clenches are dragged through the crust by main force, and the horn wantonly and unnecessarily destroyed. It is very little trouble to raise the clenches with the buffer, and, if the nails should still retain a firm hold and resist a moderate effort to displace the shoe, the punch should be used to loosen them, so as to cause the shoe to come off easily and without damage to the hoof. The smith will be amply repaid for his trouble by the unbroken horn he will find to nail to, and the firmer hold he will obtain for his nails when he comes to nail on the new shoe. Having taken off the shoe the rasp should be passed round the lower edge of the crust before the foot is let down, to remove the jagged edge, and also to ascertain that there are no stubs remaining in the horn: if the edge is not rasped it is apt to split and break when the horse moves, which he is sure to do as soon as his foot is on the ground again. No horse should have more than one foot bared at a time; however strong his feet may happen to be, he is sure to stand quieter on a shod foot than he can on a bare one, and it will prevent his breaking the crust. A horse with weak flat feet is in positive misery when forced to sustain his whole weight on a bare foot, while the opposite foot is held up.

Previous to preparing the foot for the reception of the new shoe, we must consider, first, the kind of foot we have to deal with; and next, the condition of the roads it will have to travel upon; for it would be manifestly improper to pare a weak flat sole as much as a strong arched one, or to pare either as much when the roads are hard and covered with loose stones as when they are moist and even. No general rule, therefore, can be laid down that would apply to all kinds of feet, or indeed to the same foot at all times; the amount of paring the foot is to undergo must entirely depend on the above considerations.

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

A weak flat foot, on the contrary, will bear no shortening of the

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

The bars are not separate and distinct portions of the hoof, but simply continuations of the crust reflected or turned back at each heel in the direction of the centre of the sole, where they meet in a point and form a triangular space for the reception of the elastic cushion, usually called the sensible frog: each of these reflected portions, at its deepest part, rises about an inch into the cavity of the hoof, and is connected at its upper part, throughout its whole extent, on one edge with the horny sole, and on the other with the horny frog, whereby the horny covering of the foot is completed and made continuous. This doubling back of the crust on each side, from the heel to the point of the frog, together with the increased thickness of the crust itself at the extremity of each heel, is evidently designed to keep the heels apart, and prevent their pressing inconveniently on the structures within the hoof; and if the substance of the horn be thinned by paring the sides of it, it is clear that its power of resistance must be diminished, the natural action of the foot damaged, and the chance of contraction greatly increased. Many smiths, who are merciless in paring the sides of the bars, which ought never to be touched by a knife, waste much time and patience in preserving the portion that projects beyond the surface of the sole, which they had better have pared down nearly to a level with the sole, as it only impedes the removal of the dead horn from the corner of the sole at the heel, and would have been worn away, if the presence of the shoe had not prevented it.

The frog may be said to consist of three portions, viz., the horny frog, the sensitive frog, and a thick elastic cushion, which is interposed between the sensitive frog and the navicular joint, for the purpose of protecting this important little joint from injury: the portion, however, with which we are now more immediately concerned, as connected with the mechanical art of shoeing, is the horny frog.

No part of the foot shows the difference between good shoeing and bad so soon, or so palpably, as the frog. The frog of a foot that has been well shod for some time presents a full, plump appearance, with an even surface and a broad oval cleft, with a well-defined edge, not broken through at the back; whereas a frog, that has been long subjected to bad treatment, is shrunk and hard, with a ragged uneven surface and a narrow cleft broken through at the back, and extending up between the bulbs of the heels. The horn of the frog is thinner

and of a closer and more delicate texture than the horn of the hoof, and is evidently intended not only to protect the parts immediately above it, but also to prevent the evaporation of the moisture which keeps these parts in a soft, yielding condition; but it cuts so easily, and looks so clean and trim when its surface is pared off, that very few smiths indeed can be prevailed on to leave it alone, and not even cut off the rags; nevertheless they had better do so, for those very rags which they think it desirable to remove were caused by paring off the surface of the horn at the last shoeing, whereby a part was lain bare that never was intended to be exposed to the action of the air, and which in consequence became dry and hard, and soon cracked, and the edges having curled outwards formed the rags which are so offensive to the eye of the smith; and, if he should be tempted to remove them, he will again lay the foundation of other cracks and other rags, until at last the frog will have dwindled down by small degrees to half its original size. Now if, instead of persisting in this gradual work of destruction, he would only leave the frog alone, and never touch it with a knife, the rags in due time would entirely disappear, and the frog become covered by a coating of newly secreted horn. The horn of the frog, when left to itself, is always undergoing a process of exfoliation and reproduction. The exfoliation for the most part occurs in small particles, resembling the dust which adheres to Turkey figs; but at other times the whole surface of the frog will exfoliate in a mass, leaving a smaller, but still perfect, frog beneath, covered with sound horn. The small particles of exfoliated horn may best be seen in the feet of horses shod with leather, where the artificial covering has prevented their escape; and so little is this natural process of exfoliation understood by horse-masters in general, that I have frequently had my attention gravely directed to the accumulation of these particles, as unmistakable evidence of the leather having rotted the frog.

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

The safest guide to the proper amount of seating is to apply the shoe to the foot, and observe whether there is room for a picker to pass freely between the shoe and the sole; if there should not be sufficient space for a free passage all round the shoe the seating must be increased; and if there should be more than is necessary, it must be

diminished. The smith, having carefully prepared the foot, and selected a shoe with a proper amount of seating for it, has next to cut off the heels, and fit the shoe to the foot; and he must always bear in mind that fitting the *shoe* to the *foot* does not mean fitting the *foot* to the *shoe*—an error that smiths are prone to fall into.

I have very frequently had occasion to remind a smith, that he was saving himself trouble at the expense of the horse by accommodating the foot to the shoe, instead of altering the shoe to the foot; and it must be confessed, that unless a smith is encouraged to take an interest in his work, by the owner of the horse paying an occasional visit to the forge, and showing that he, too, is interested, it is very tempting to him, when he finds the foot and the shoe do not come well together, to adopt the more expeditious and less troublesome course of substituting the knife and rasp for the hammer and anvil. Every forge is expected to be supplied with store shoes "turned in the rough," and if they were left longer in proportion to their width, and straighter at the quarters, with the heels wider apart than we usually find them, the labor of fitting the foot accurately would be greatly diminished, as we shall see when we come to consider that part of our subject. The first thing, however, that demands our attention is the mode of cutting off the heels to the required length; and for this purpose a curved chisel, as shown in Fig. 1, is a more convenient tool than a straight one, and saves the smith much trouble in "filing up" the shoe before he nails it to the foot; it removes the corners and rounds the points of the heels at once, and enables him to fit the heels of the shoe to the heels of the hoof with greater nicety than he can possibly do when they are cut off square. The best manner of proceeding is to remove a small corner from the outer rim on each side, and a larger and longer portion from the inner rim, as shown by the dotted lines A B C, in Fig. 2. By this mode of cutting off the heels the outer rim of the shoe is lengthened, and the inner rim shortened, without diminishing the width of the web, as shown at A C, in Fig. 3. After the heels have been cut off, as directed above, the nail-holes should be opened; and the best mode of doing it is to make them pass straight through the shoe, instead of inclining inwards in the direction of the centre of the hoof, as is almost invariably

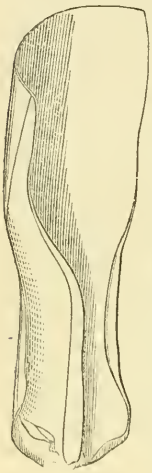


Fig. 1.

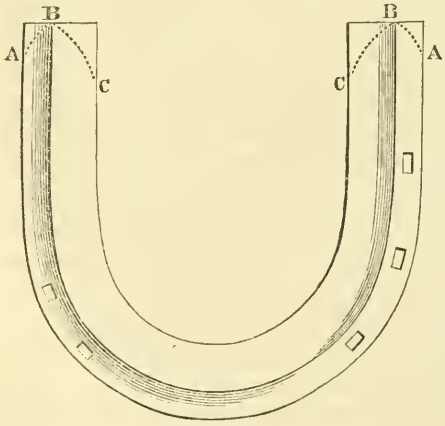


Fig. 2.

done, the effect of which is to convert a simple and safe operation into one of difficulty and danger, for the nails must first be driven with their points inclining inwards, and then outwards, until at last they emerge high up in the thinnest part of the crust, having split their way out in the direction of the fibres of the horn, with a great probability of some portion of the shanks lying so close to the sensitive lining of the hoof as to press upon it when the foot is in action and expands. Where the holes are thus made to incline inwards it requires considerable dexterity to drive the nails so as to steer clear of the many dangers that lie in the way. I do not allude to the graver matter of pricking the foot, as it is called, but to the thousand and one varying degrees of pressure from the shanks of the nails, causing constant uneasiness, or, it may be, pain in the foot. If the quick has been wounded the horse soon tells the tale, but if he is only uneasy from pressure, he bears it patiently, and it is never known to his master, although it is very frequently the unsuspected cause of broken knees.

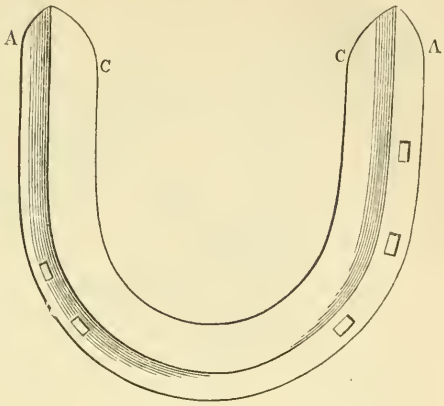


Fig. 3.

We hear much about rolling stones in the road causing broken knees; a rolling stone is a very convenient scapegoat for a large amount of bad riding, bad driving, and bad shoeing; but, I take it, we should be much nearer the truth, in nine cases out of ten, if we attributed the misfortune to misplaced nails, driven through holes slanting inwards. When the nail-holes are made to pass straight through the substance of the iron, and the angle at which the hoof meets the shoe is considered, it will be self-evident that nails, driven *straight* through those holes, must cross the grain of the horn and come out low in the crust, presenting the strongest portion of the shank for a clench; and my experience tends to show, that nails so driven obtain a much firmer hold in consequence of their piercing the horn *across* the grain, than nails driven higher up the crust *with* the grain.

A few observations on the fuller, or groove in which the nail-holes are stamped, may not be out of place here, with a view to correct an error that almost all smiths fall into, of making their fullering-irons so fine and thin, that the grooves produced by them will not permit the heads of the nails to sink into them as they ought to do. They appear to forget that the safety of a half-worn-out shoe depends on the heads of the nails having sunk well into the groove, and fairly blocked the bottom of the holes. They are all impressed with the notion that a narrow fuller, with sharp well-defined edges, looks neat

and indicates skilful workmanship; and perhaps it does look neater than a coarse, open groove, but it is attended with the great disadvantage of being much less useful. An open fuller affords more space for the head of the nail, and prevents its becoming tied in the upper part of the groove before the lower portion has descended to the bottom of the hole, which invariably happens when the fuller is deep and narrow.

Horseshoeing at best is but a necessary evil, and cannot be elevated to the rank of an ornamental art; smiths had better, therefore, confine their views to the utilitarian principle entirely, and thereby endeavor to make it as little hurtful to the horse, and as little inconvenient to his master, as they possibly can.

Having cut off the heels and opened the nail-holes, the next thing to be done is to turn up a clip at the toe preparatory to fitting the shoe to the foot, which latter operation should always be commenced at the front of the foot, and be gradually and carefully carried back to the quarters and heels. Every shoe should have a clip at the toe, to prevent the shoe being driven back on the foot and bending the nails in the crust; but I strongly object to the clip, which I often see turned up on the outside of a shoe, which is not only useless but destroys more horn than two or three nails would do.

No one doubts the fact of horses travelling safer and better in shoes a week or two old than they do in perfectly new ones; and this arises from the fact of their having worn away a portion of the iron at the toe, and thereby diminished the jar which the foot had previously received from the front of the toe coming in direct contact with the surface of the road. In order to relieve the horse from any unnecessary jar to the foot I always have the whole breadth of the toe of the shoe turned up, so as to raise the ground-surface of the shoe at the toe above the level of the ground, by which arrangement horses are found to trip less, and put their feet down with greater confidence. The plan of welding a lump of steel on to the toe of the shoe only makes bad worse; it increases the jar, is longer wearing away and causes the horse to trip more and for a greater length of time; whereas turning up the toe of the shoe obviates the evil at once, and makes the shoe last quite as long as the steel would have done. All feet will not bear the same amount of elevation of the toe: strong feet will bear a good deal, but flat feet with weak horn will bear only a little; still that little should be imparted to the shoe. The old shoe, placed on a flat surface, will afford a very good guide to the amount of elevation to be given to the toe of the new shoe, provided the old one is not worn so much as to be thoroughly and entirely worn out.

A very convenient and handy tool for turning up the toe of a shoe may be made by welding a piece of bar-iron five inches long, one inch broad, and somewhat less than a quarter of an inch thick, crosswise on to each blade of a pair of smith's tongs. Any smith can manufacture such a tool for himself, and will find it very useful by enabling him to grasp both limbs of the shoe at the same time, and turn up the toe over the end of the anvil without twisting the shoe, which he could not do with common tongs; and he can easily restore the seat-

ing at the toe by merely turning the shoe on the anvil. Fig. 4 will show this tool in use. Having turned up the toe of the shoe and fitted it carefully to the toe of the hoof, the smith must direct his attention to the quarters and heels, and whatever shape they may happen to take, that shape must be implicitly followed by the shoe; whether the quarters be straight or curved, or the heels narrow or open, the shoe must follow the same shape; it is a grievous mistake to suppose, as too many persons do, that it is in the power of the smith to change the form of the foot by merely changing the form of the shoe: what are called open-heeled shoes will not make open-heeled feet. The situation of the nails alone can alter the form of the foot, either by preventing or permitting the hoof to expand to the weight of the horse. If the shoe is nailed from heel to heel the hoof cannot expand, and the foot must become damaged; but if it be nailed, as I direct, with three nails on the outside and two on the inside, a foot, that has been already damaged by bad shoeing, may to a great extent be restored by thus permitting the foot to expand.

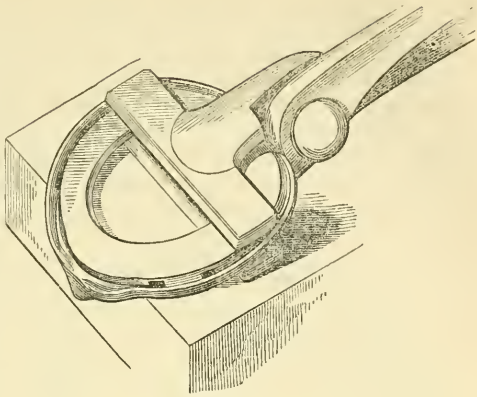


Fig. 4

As a general rule, the first nail on the outside should be placed an inch and a half from the centre of the toe, the second in the middle of the quarter, and the third just behind the quarter; and on the inside, the first nail should be rather more than an inch from the centre of the toe, and the second about three-quarters of an inch behind it; by this arrangement the whole of the inner quarter and heel are left unfettered and free to expand, and any undue pressure on the sensitive parts of the foot, from the descent of the bones into the hoof, is avoided. Fitting the heels will call for a little extra care at first, as it involves the abandonment of some deep-rooted prejudices and groundless fears. First, the prejudice in favor of square heels projecting beyond the hoof, both behind and at the sides, must be yielded; and the fear lest the smallest portion of the shoe should happen to touch the frog must be given up, before anything like accurate fitting can be obtained. The edge of the shoe must be made to correspond with the edge of the hoof all round, from heel to heel, and to do this effectually, and to keep the web of the shoe as wide at the heels as it is at the toe, the heels must be brought in until they very nearly touch the frog. I would not have them bear on the frog, but I would rather see them touch it than be able to lay my finger between the frog and the shoe.

There are many advantages attending the bringing in of the heels, and not one single disadvantage to set against them. In the first place, it removes all the points and projections by which stiff ground is enabled to pull off the shoe; in the next place, it affords a good,

firm, flat surface for the heels of the hoof to rest upon, and, by bringing the sides of the shoe nearer together, the navicular joint, which lies in the hoof above the frog and about an inch from its point, is saved from many an unlucky jar from a stone in the road, by the shoe receiving it instead of the frog. The shoe must not only fit the edge of the crust, but the whole of the crust must have an even bearing on the shoe, and this can only be effected by making the shoe hot enough to scorch the horn, and applying it to the foot. The quantity of horn to be thus destroyed, when the foot and shoe have both been made as level as the smith can make them, is very inconsiderable, and the heat so applied can do no harm. I would not have the shoe burnt into its place on the foot without previous preparation, as is very often done to save a little trouble, but I would have the hot shoe applied so as to insure a close fit all round. A thin, weak hoof will not bear as much heat, without inconvenience to the horse, as a strong one; but as a close fit is of even more importance to a weak hoof than it is to a strong one, it is essential that the shoe be applied to it hot enough to scorch the projecting portions of horn, in order that they may be seen, and removed by a rasp.

It is a very good plan, in fitting the shoe to the inner quarter and heel, to keep the rim of the ground-surface of the web within the rim of the foot-surface, somewhat after the fashion of the shoe in common use for preventing cutting; it enables the horse to withdraw his shoe from stiff ground without the chance of leaving it behind him, which he will inevitably do if any portion of the shoe is permitted to project beyond the hoof. When the shoe has been carefully fitted to the foot it must be cooled and "back-holed;" that is, the nail-holes must be opened on the foot-surface of the shoe; and in doing this care must be taken to break down the *outer* edge of all the holes, so that the nail may pass straight through the shoe without any inclination inwards, and the openings should be made large and free, to prevent the shank of the nail becoming tied in the hole before the head has been driven fairly home.

The shoe has then to be "filed up" preparatory to being nailed to the foot; and I may here observe, that much time and labor are generally wasted in polishing portions of the shoe which might very well be left alone; all that is really necessary is to round off the sharp edges, remove any "burs" that may project from the surface, and file the foot-surface of the heels, as shown at F, in Fig. 5. Fig. 5 shows the foot-surface of a near fore-shoe; A, the clip at the toe; B 1, the outer quarter; B 2,

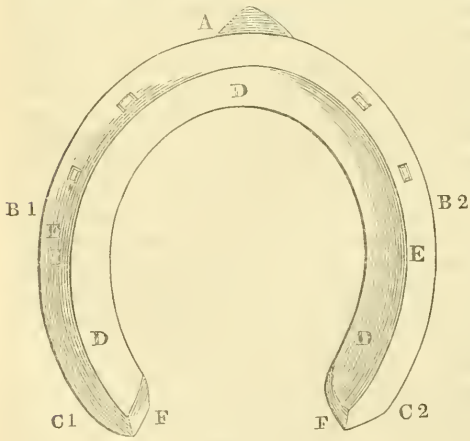


Fig. 5.

the inner quarter; C 1, the outer heel; C 2, the inner heel; D, the seating; E, an even flat surface from heel to heel for the crust to bear upon, and in which the nail-holes must be placed. They must never be permitted to encroach on the seating, but be always confined to this flat surface; F, the ends of the heels filed away in a direction upwards and outwards, the object being to prevent pressure on the frog without diminishing the width of the web on the ground-surface of the shoe. Fig. 6, the ground-surface of the same shoe. A, the toe turned up out of the line of wear; B 1, the outer quarter; B 2, the inner quarter; C 1 and C 2, the heels; with D, the web as wide as at any other portion of the shoe; E, the fuller. It will be observed that the inner quarter of the shoe, marked B 2 in each of the figures, is considerably straighter than the outer quarter marked B 1, which is the natural shape of a well-formed foot: the inner quarter is not only straighter and more upright than the outer quarter, but the crust is thinner and more elastic, and consequently expands in a greater degree to the horse's weight; but when we talk of the hoof being elastic and the foot expanding, we would by no means have it inferred that they bear any relation to the elasticity or expansion of India-rubber; if they did, the bones of the foot would be thrust through the hoof during violent action, or in a down leap. The elasticity and expansion are small in degree, scarcely exceeding the eighth of an inch in the feet of most horses, that have been several times shod, but they are most important in their consequences, by affording exactly the amount of enlargement of the cavity necessary for the descent of the bones of the foot, without squeezing the sensitive parts which line the hoof.

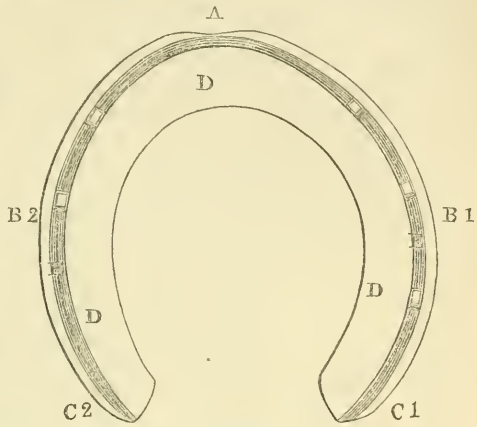


Fig. 6.

Before I say anything about nailing the shoe to the foot, I have a few observations to offer on the nails usually employed for the purpose, which are very defective in form and ill-contrived for obtaining a firm and lasting hold, although I am bound to confess that I have lately seen a manifest improvement in some of the nails of commerce; but the general run of them are made with heads so short, square and broad at the top, and so small and narrow at the bottom, with shanks springing suddenly from them, that the upper part becomes tied in the fuller before the lower part has reached the bottom of the hole, and the consequence is, that the bottom of the hole is occupied by the shank alone, and before the shoe is worn out the

head of the nail is gone, and little more than a brad remains to retain the shoe.

The smiths who shoe my horses make their own nails, and I recommend others to do the like, at least for the better class of horses; it gives them an opportunity of choosing their rods, making their nails of a better shape, and cooling them more gradually than the wholesale manufacturers do, whereby they are rendered tougher and less liable to break. The head of the nail should be oblong on the top, straight-sided at the upper part, and die away gradually into the shank with a broadish shoulder, to fill the opening made by "backholeing" the shoe; hence the necessity for these openings being larger and freer than they are usually made. A nail so formed will always retain the semblance of a head, and can never be reduced to a mere headless brad. The shank should be less taper, and the point less elongated, than those of the nails in common use. The shorter point and broader shank supply a firmer and better clench.

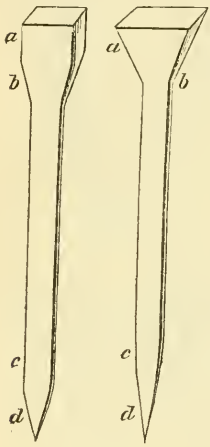


Fig. 7.

Fig. 7 represents the two nails I have been endeavoring to describe; but a comparison of the letters attached to each will perhaps convey more clearly what I mean than my words may have done. When the nail-holes are in the right places and pass straight through the shoe, and the shoe has been properly fitted to the foot, the difficulty of nailing it on is reduced to nothing, and might almost be handed over to a carpenter to do with as much confidence as to a smith; the nails have only to be driven straight, and they must pass through the shoe, across the substance of the horn, avoid the sensitive parts altogether, and come out in their right places, presenting the strongest portion of the shank for a clench, instead of the thin narrow point; the smith has then only to twist off the projecting portion of the nails, cut a notch in the hoof to receive the turned-down clench, and bury it with his hammer in the notch so formed, and not touch it again with a rasp; in fact, a rasp should on no account whatever be applied to the surface of the hoof above the clenches; it tears and destroys nature's covering, designed to keep the horn moist and tough, and renders it dry and brittle.

I shall, no doubt, astonish some persons when I assert that nearly all the evils incident to horseshoeing are attributable to the affectation and dandyism of the smith, who is not contented to follow a necessary and useful art, simple in its mechanical parts, but calling for the exercise of some judgment in its application, but he must import into it dangerous difficulties and mischievous ornament: for instance, he assumes that a deep narrow fuller, with small nail-holes inclining inwards, and still smaller openings on the foot surface of the shoe, present a neat, trim appearance, and show that he is master of his art; knowing full well, that nothing but long practice could enable any one to navigate a nail safely through a channel beset by so many

dangers; but he entirely overlooks the fact that the power to do so has nothing to recommend it but the danger and risk attending the performance. Again, he imagines, that a hoof carefully rasped all over imparts an air of finish to his work, of which he feels proud, forgetting altogether that he has removed a most important covering from the hoof, for which no amount of ornamental finish can compensate.

I am anxious again to impress on smiths and their employers that horseshoeing is at best but a necessary evil, and that any attempt to raise it to the rank of an ornamental art must be attended with damage to the horse and inconvenience to its owner. My sole object is to render it as safe, simple, and useful as possible; to divest it of all difficult and dandy crotchets in its application, and reduce it to one principle, to be carried out in the shoeing of all sorts of horses, at all sorts of work.

This principle, which admits of no variation, may be summed up as follows: the shoe must fit the foot from heel to heel, whatever the shape of the foot may be, and the crust must have an equable bearing on the shoe all round; the toe of the shoe must have a clip in the centre, and, when the foot will bear it, the toe must be elevated from the ground; the nail-holes must be so placed as not to encroach on the inner quarter, but leave the inner quarter and heel free to expand, and they must pass straight through the shoe; the frog must never be touched by a knife, or the surface of the hoof by a rasp. The detail may fairly be left to the judgment of the smith, who will be able to determine the description of shoe best calculated to meet the requirements of the foot that he has to deal with; he will have to consider whether it is strong and upright, or weak and flat, and be guided by those circumstances as to the substance, width of web, and amount of seating the shoe must possess, and also the degree of elevation of the toe the foot will bear. These are matters of detail infringing no part of the principle, and may and ought to be left to the experience and judgment of the smith. Fig. 8 represents the ground surface of a near fore foot, shod as it ought to be, and Fig. 9 represents the same foot, with the shoe rendered transparent, showing the portions of the foot that are covered and protected by it, A the crust, B the bars, and C the heels; it will be seen, moreover, how bringing in the heels diminishes the opening of the shoe and lessens the chance of stones in the

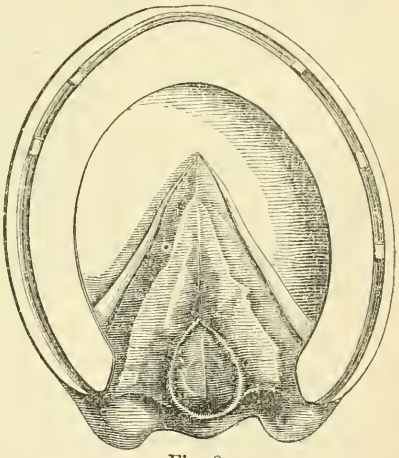


Fig. 8.

road bruising the frog; one side or other of the shoe would alight upon them and save the frog. I may observe in passing, that corns have never failed to disappear under this mode of shoeing; they are always the consequence of bad shoeing, and good shoeing always removes them. I could not keep a corn in my stable, if I desired it ever so much, unless I altered my plan of shoeing. A large number of flat-footed horses cannot go safely at any time without some protection over the sole, and all horses would be benefited by it when the roads are strewed with loose stones; but it is a mistake to suppose that leather, or any substitute for it, inserted between the shoe and foot, calls for a greater amount of fastening than five nails; they will retain a shoe, with leather under it, as firmly as if the leather were not there: all that is required is, to make the leather fit the shoe as accurately as I desire the shoe to fit the foot, and that no projecting portions be left either behind or at the sides of the heels, and instead of the leather being cut square at the heels, I would have it slightly arched inwards from heel to heel. It is necessary, however, to prepare the foot, before the leather is put on, and the best way of doing it is to smear the whole lower surface of the foot and frog with common tar; gas-tar must be especially avoided, as it dries and hardens the horn, instead of keeping it moist and promoting its growth, as common tar does; then the hollow on each side between the frog and the crust, from the point of the frog back to the heels, should be filled with oakum dipped in tar, and pressed down until the mass rises somewhat above the level of the frog on each side, and gives it the appearance of being sunk in a hollow. A small portion of oakum may be spread over the sole in front of the frog, but none must be put on the frog itself excepting the bit in the cleft, which is necessary to prevent dirt working in from behind. The best way of dealing with this bit is to pull some oakum out straight, twist it once or twice, fold it in the centre, then dip it in tar and press it into the cleft, and carry the straggling ends across the frog, to mix with the mass on the side of it. Oakum is a much better material for stopping the feet than tow.

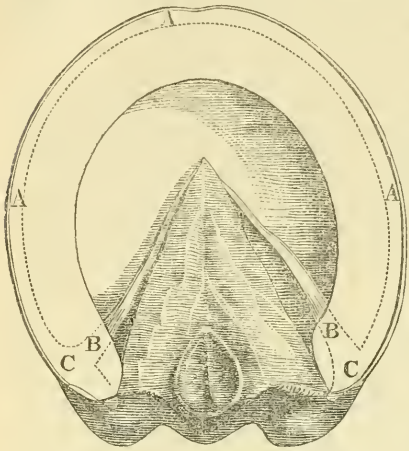


Fig. 9

The usual mode of stopping the feet is to take a large wad of tow and spread it over the whole of the sole and frog in one mass, which is most objectionable, inasmuch as it causes a constant pressure on the frog, which is just what the stopping, to be at all useful,

should prevent. Fig. 10 shows the stopping, properly placed in the foot, and Fig. 11 shows the appearance the same foot would present when properly shod with leather. Just as I had proceeded thus far with my subject, I received a letter from a gentleman in the north of Devon, containing the following anecdote, and as it bears on the matter I have in hand, I will at once record it. He appears to be a zealous advocate for the system of shoeing I have recommended, which I gather from his letters, for I have not the pleasure of his acquaintance. He tells me that a short time ago he sent his bailiff to a sale some ten miles off, and directed him to take a very hot pony he possesses, which had never been previously used excepting in the plough: this pony was shod with only four nails in each fore shoe, and he cast one of them by the way. The bailiff took him to the nearest forge, and told the smith to put on another, and at the same time called his attention to the way in which his shoes were made and put on. His reply was, "I never saw a horse shod like this; it will never do for this country; no wonder he cast his shoe: but I'll put one on my way, and I warrant he won't throw that." Accordingly the shoe was put on, nailed inside and out with eight nails, and two or three days afterwards the pony went to plough again in some stiffish clay for an hour or two, and when his work was finished it was found that he had left his new shoe behind him somewhere in the clay, but the other shoe, with four nails in it, was safe on his foot.

Fig. 10.

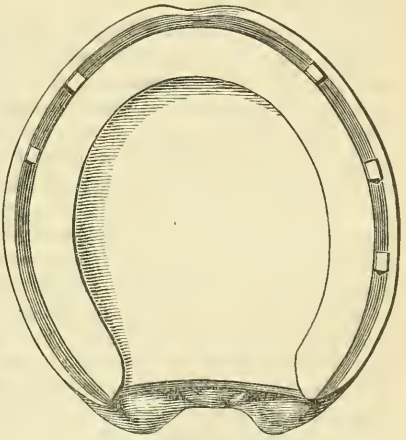


Fig. 11.

The fact is, that a larger number than five nails are never required excepting for the purpose of counteracting defective fitting, and in this case the fitting was clearly so bad that even eight nails could not hold it, although placed in the small shoe of a pony. I may mention here that a few days ago my groom picked up a shoe in the road with nine nails sticking in it, and I was struck with his observation on

finding it. He said, "if this had been one of our shoes, sir, with only three nails in it, there would have been a pretty talk about it; but as there are *nine*, no one will say anything about it:" and I have no doubt of the correctness of his conclusion, for human nature is prone to be very tender over the misfortunes of long-cherished prejudices, but merciless in its visitations on the failure of any attempt to correct them.

The hind foot is differently formed from the fore foot, and requires to be differently shod; nevertheless, the same principle of fitting the shoe to the foot, whatever its shape may be, bringing in the heels close to the frog and placing the nail-holes so as to permit the inner quarter and heel to expand, applies with equal force to the hind as it does to the fore shoes. One of the great mistakes smiths fall into in shoeing hind feet is squaring the toe, and placing a clip on each side of it, with a view, as they say, of preventing the horse striking the toe of his hind shoe against the heel of his fore shoe, and producing the disagreeable sound, called "forging;" but as a horse never does forge with his toe, the plan of squaring it and the reason assigned for it equally fail in their object, and, like many other fallacies connected with the art of horseshoeing, produce the very results they were intended to obviate.

A horse forges by striking the outer rim of each side of the hind shoe, just where it turns backward, against the *inner* rim of the fore shoe, just behind the quarters; therefore the broader the toe of the hind shoe is made by the squaring and the clips, the more likely the horse is to strike it against the fore shoe. It happens in this way: the horse fails to carry his fore foot forward quickly enough to get it out of the way of the hind foot, and the toe of the hind shoe is thrust into the opening of the still held up fore shoe, and the outer edge of the hind shoe strikes against the inner rim of the fore shoe and produces the sound. I have entirely cured several horses of forging by merely causing the corners of the artificially-squared toe to be removed and the toe restored to its natural form.

The best mode of treating the toe of the hind shoe of all horses is to make it rounding and rather pointed, and to turn up a small stout clip in the centre: the toe should be tolerably thick, as the wear is always great at this part of the shoe, and the back edge should be rounded with a file, particularly for horses at all likely to be put to fast work; it prevents the chance of "overreach," which, like forging, is often erroneously attributed to the front of the toe, but is invariably caused by the back edge, which, in a half-worn-out shoe becomes as sharp as a razor. The accident is very properly named, for the horse really overreaches the fore foot with the hind foot, and the back edge of the toe of the hind shoe in its return passage to the ground strikes the soft part of the heel of the fore foot, and often produces a wound that is very troublesome and difficult to heal.

The only other portions of the hind shoe which require special attention are the heels, and in dealing with them we must depart widely from the principle I have hitherto advocated of following nature as closely as possible. We are compelled to have recourse to art, not, however with a view of assisting, much less with a view of

improving, nature's contrivances, but for the sole purpose of counteracting what, it must be confessed, is to a large extent a necessary interference on the part of man. Nature made horses with flat heels, but she put no sharp bits in their mouths; she left them free to choose their own time for stopping and their own mode of doing it; but as soon as they are subjected to the control of man, his heavy hand and sharp bit pull them up without warning, and without the smallest reference to the position they may chance to be in at the time, or indeed without reference to anything but his own sudden impulse. We must therefore do all we can to guard the poor horse against the numberless strains und injuries incident to his changed condition, and the best mode of effecting it is to raise the heels of the shoe, and keep the natural heels as far from the ground as is practicable without throwing the foot too much on the toe.

The plan I have adopted for many years past is to have the heels forged longer and deeper than is commonly done, and when the ragged ends have been cut off, the heels are made red hot, and the shoe placed in the vise with the heels upwards and projecting; the smith then hammers them down, to shorten and condense them, until the mass is reduced to about an inch and a half in length; he then removes the shoe from the vise and makes the top, bottom, and sides of the heels flat on the anvil, preparatory to fitting the shoe to the foot, taking care that both heels are of an equal height. This plan affords a larger and more even surface of support than mere calkins would do, and is better for fast work; but calkins are very useful for heavy draught, provided they are made of an equal length at each heel. Nothing is more distressing to a horse than working in shoes that bear unevenly on the ground, twisting and straining his joints at every step he takes.

Some horses have a habit of striking the foot or shoe of one side against the fetlock joint of the other side either with their fore or hind feet, and various devices have been at different times suggested as a remedy for the evil; but as each horse has his own mode of doing it, much difficulty is often experienced in hitting upon the right one. I have frequently solved the difficulty by placing a boot, or piece of cloth covered with damp pipe-clay, over the injured part, and then causing the horse to be trotted along the road, and he generally returns with some of the pipe-clay adhering to the offending portion of the opposite foot or shoe, as the case may be, pointing out pretty clearly the part to be lessened or removed. The adoption of this simple plan has saved many a horse from months of torture arising from ill-contrived shoes and misapplied remedies.

As a general rule, horses' shoes should be removed once between each fresh shoeing; but this, like all general rules, admits of exceptions, for if a horse wears out his shoes in less time than a month, they had better not be removed, or if he has a weak, brittle hoof, and does not carry his shoes longer than five or six weeks, they had better remain untouched, as such feet grow horn very slowly, and are rather injured than benefited by frequent removal of the shoes; but a horse with strong feet, who carries his shoes over a month, should

have them removed and refitted at the end of a fortnight or three weeks, dependent on the time his shoes are likely to last.

The treatment, or I might almost call it the ill-treatment, that horses' feet receive in the stable requires a good deal of revision, and might very well commence with the all but universal custom of washing the feet and legs with cold water the moment the horses return to the stable from their work, when they are often heated, tired, and exhausted. Nothing can be more injudicious than subjecting them to the sudden chill, caused by a liberal application of cold water to their legs and feet at such a time, and then leaving them to dry as best they can. The amount of cold produced during the process of evaporation is so great, that the poor beasts remain in a state of chilled wretchedness for many hours before they become thoroughly warm again. If their legs and feet must be washed as soon as they return from their work, let it be done with water that is quite hot, and let them be rubbed dry immediately; they will then feel warm and comfortable, instead of being cold and miserable; but as many stables are not provided with hot water at command, the best plan is not to wash them at all when they first come in, but merely to pick out the feet, clean off the dirt, and leave them for several hours, until the circulation has recovered itself and subsided into a natural state, or even until the following morning, when they may be safely washed with cold water, and the delay will do no harm.

Horses' feet are generally kept too dry in the stable; they all require moisture, and the best way of applying it is to surround the hoof by a wet swab, and keep it on for a few hours during the early part of the day, before the horse has been to work, but it must never be put on after his return from work. The feet should be stopped at night, and the best thing to do it with is fresh cow-dung, without any admixture of clay; when clay is added, the heat of the foot dries it, and the stopping becomes hard and does the foot more harm than good. Many persons, to save themselves a little trouble, substitute horse-dung for cow-dung; but they will do well to forego the whole of the trouble, and not stop the foot at all, rather than use horse-dung for the purpose.

It is a very good plan to smear the hoofs, sole, and frog all over with some emolient dressing every morning, as soon as the horse has been cleaned and got ready for the day; it need not interfere with the use of the wet swabs, which may with advantage be placed over it. I have used the following preparation for many years in my stable, and have found it to be very efficient in preserving the natural covering of the hoof in a good healthy state, and, as a necessary consequence, the horn beneath it elastic and tough:—To a pound and a half of lard add a quarter of a pound of beeswax, a quarter of a pound of common tar, and a quarter of a pound of honey; melt the lard and beeswax together, and then stir in the tar and honey: they require to be stirred for some little time, until the mass begins to set. I am informed that the addition of two or three ounces of glycerine will prevent the mass becoming too hard, and I have no doubt, from the peculiar oily properties of glycerine and the numerous purposes for which I find it is used in surgery, that it would prove a val-

uable addition to the hoof-dressing. What is required is some covering that shall prevent the escape of the natural moisture of the hoof, and at the same time be emolient, adhesive, not too fluid, and free from any irritant.

Various causes have combined during the last few years to enhance the value of horses of every description, and it has become incumbent on every one, whose attention may have been particularly called to the subject, to communicate any information his experience and careful observation has supplied him with, and which he believes may be of use to his neighbors, by arousing them from the state of apathy into which many of them have permitted themselves to fall concerning a matter of so much importance to them commercially and personally as the soundness of their horses' feet.

Dixfield, December, 1857.

[NO. 3.
NEW SERIES.]

A

PRIZE ESSAY

ON

FAIRS.

BY

ALLEN W. DODGE,
OF HAMILTON, MASS.

BOSTON:
1858.
J. H. EASTBURN'S PRESS.

ESSAY.

In offering its prize for the best essay on the advantages to be derived from establishing regular fairs or market-days throughout the State, for the sale and exchange of agricultural products, it is presumed that the Society did not mean to consider the question as settled in favor of such fairs; but wished rather to elicit inquiry into their merits as compared with the prevailing modes of disposing of the products of the farm; and if, upon a careful and candid consideration of the question, it should be found that there were sufficient and weighty reasons for the establishing of such fairs, that then some practical plan should be proposed for this purpose.

These fairs or market-days, which in fact are nothing more than a periodical concourse of people at a stated place for selling and buying agricultural commodities and for hiring laborers, have long been in successful operation in Great Britain. To the farmers there they are of great importance, constituting their chief, or perhaps their only, opportunities of effecting profitable sales or purchases of stock. The different breeds of neat-stock, of horses, of sheep and of swine, are exposed to sale, often in large numbers and of great excellence, at the local fairs in the quarter where they are raised; and they attract to them dealers from a distance, with the certainty that they can find just the description of animals they are in want of. This, with the local attendance, usually ensures a brisk business. And so great is the convenience of a market-day considered to be to the neighborhood in which it is held, that new fairs are constantly springing up, the only limitation to their number being the amount of business which may be controlled by them.

Besides live-stock, fruit, vegetables and grains find purchasers at these fairs, and they are offered for sale either in bulk or by sample, the latter being the more usual way of disposing of large quantities of any commodity. Most of these fairs, too, have a well-known and specific character, and are noted, some for the superior quality of one kind of stock or of produce, and others for that of another kind. And they often receive their name from the predominant article exposed to sale, as, for example, a fair at which large quantities of cherries are presented, is called the Cherry Fair, and one of which sheep is the characteristic feature is called a Sheep Fair.

But in this country, or at least in New England, we have nothing answering to these fairs or market-days. The nearest approach to them are the cattle markets established in the immediate vicinity of our largest cities, and mainly for the supply of the meat for their consumption, as those held weekly at Brighton and Cambridge, in our own Commonwealth, and which are the only markets of any extent for the sale of live-stock, within her borders. These, however,

differ in some important particulars from the fairs proposed for consideration. They are exclusively for the sale and purchase of live-stock, and that stock is mostly brought from a distance, sometimes even from the far West. They afford a good opportunity for farmers in the surrounding country to purchase such animals as they stand in need of, and they are resorted to very generally by them for this object. But they are not intended to encourage the sale of stock by these farmers, for the very obvious reason that but little or no stock is raised by them. They are also very inconveniently located, being at one extremity of the State, and therefore can be attended by the larger part of the farming population only at great expense.

What, then, would be some of the benefits of regular fairs or market-days, established throughout the State, for the sale and exchange of agricultural products—benefits that might reasonably be expected from them? In the first place, they would offer to every enterprising farmer in their neighborhood a home market, or a market near at hand and easy of access. Studded all over as Massachusetts is—especially on her eastern borders—with cities and large towns and manufacturing villages, it might be thought that the farmers are amply supplied with good markets and at their very doors. To some extent this is indeed true, but it is equally true that very many farmers—a majority perhaps—are obliged to travel eight or twelve miles and sometimes more, in order to reach their nearest market town. The loss of time in thus travelling to and from market, and the wear and tear of horse and vehicle, are no inconsiderable items of expense to the farmer who is placed in this unfavorable position in regard to markets. Suppose that he follows the market weekly for two thirds of the year, there are then thirty-five days to be deducted from the working-days of the year, and if in the fall he goes to market two or more times in a week, the number would be increased fully to fifty days, including the occasional days in winter devoted to this object.

But the establishing of regular market-days in towns near to these farmers, would prevent very materially this heavy loss of time and the expense, to which they are now subjected. If there were twelve such market-days in a year, that is, monthly markets, where they would be sure of finding purchasers, they would save the difference between twelve and fifty days of time, which they then would have to spend on the farm in increasing its productions, besides making a corresponding saving in the service of horse and wagon. This saving to the farmer may perhaps be more sensibly measured and appreciated, by considering what has been so justly stated by Henry C. Carey, in the Plough, Loom and Anvil, for September, 1851, in respect of labor.

"The first of all the taxes to be paid by labor is that of transportation. It takes precedence even of the claims of government, for the man who has labor to sell or exchange *must* take it to the place at which it can be sold. If the market be so far distant that it will occupy so large a portion of his time in going to and returning from his work, as to leave him insufficient to purchase food enough to preserve life, he will perish of starvation. If it be somewhat less distant,

he may obtain a small amount of food. If brought near, he may be well fed. Still nearer, he may be well fed and poorly clothed. Brought to his door, so as to make a market for all his time, he will be well fed, well clothed, well housed, and he will be able to feed, clothe, lodge, and educate his children."

What is here said of labor applies with equal force to the products of labor, the nearer the market the more perfect is the power to exchange them and the higher is their price. Trite as is Franklin's proverb, it is not the less true, that "time is money." And yet our New England farmers, trained as they are to habits of thrift and economy in other particulars, and certainly not wanting in any of the essential qualifications for trade, seem, too many of them, in this important matter of marketing their produce, to set scarcely any value at all upon time. But if their time be worth to them any thing at all, if it will yield any return when skilfully employed, it surely ought not to be thus misspent, not to say squandered in a reckless and shameful manner.

In the second place, market-days, by bringing the purchaser to the producer, or rather by creating a half-way place and common ground of meeting for business, instead of the producer being obliged, as is now most frequently the case, to go to the purchaser with his commodities, would tend to make better prices and quicker and more certain sales for them. As at present managed, the farmer takes or sends to his nearest market town such things as he has to dispose of, and unless he has a regular set of customers, he may be put to much trouble and inconvenience to find a purchaser, and must then often sell to a disadvantage. If, on the other hand, there is collected a large number of buyers at a stated time and place, and there are assembled such products of the farm as all are desirous of purchasing, it is clear that there will be more or less competition, and that sales will be readily effected at remunerating prices.

The tendency of trade in this country is to centralization. The large manufacturers of cotton and woolen goods and of boots and shoes, instead of selling at their factories, have their places for making sales in the metropolis. And where the manufacturer and the salesman are united in the same person, it makes but little difference whether the factory and the shop are in one and the same place or at a distance from each other. But where the manufacturer sells his goods to the merchant, who buys to sell again,—as is the case with boots and shoes—then it makes oftentimes all the difference to the manufacturer, of a living profit by the sale of his goods, or no profit at all, whether the purchaser comes to the manufacturer, or the manufacturer goes to the purchaser. The scripture adage—"It is naught says the buyer,"—will operate in the former case with unrestricted vigor, while in the latter it will fail of its object to depreciate the price of that which it is known is wanted by the purchaser.

In the third place, no small advantage would accrue to the farmer by the establishing of regular market-days, from their tendency to equalize the prices of agricultural products. At present, prices are left to depend too much upon caprice and accident, and but little difference is made between different qualities of the same article.

An inferior article often brings as much as, or more than, a superior one; so that the sale of agricultural products resembles more a lottery than a fair and equable traffic. "What luck to day?" is the usual interrogatory put to the farmer on his return from market, meaning thereby not whether a sale was effected of his produce, but at what rates. And as a consequence of this uncertainty in prices, there is but little inducement to prepare for the market any commodity—such as butter or cheese—of a superior quality, when it is well understood that as a matter of dollars and cents, an inferior one, requiring less time and labor in its production, will pay much better. The advantage of an open market where products of a similar kind are exposed to sale side by side, is that a standard of prices is readily fixed, each takes its place according to its merit and commands the price to which it is fairly entitled. And this advantage enures to the buyer as well as the seller, and gives character and stimulus to the market.

In the fourth place, in connection with this benefit and closely allied to it, is the healthy emulation which is excited by bringing different specimens of the same products into comparison with one another. Competition of the right kind at once springs up—a competition to excel in the quality of the article produced and not merely in the price obtained for it. The man who has been contented to produce an ordinary article, because he has generally obtained a good price for it, or because he has never seen any thing superior to it, is stimulated by the success of his neighbor, both as to the quality and price of his products, to produce a better; whilst the other to maintain his advantage and to avoid the mortification of being surpassed by his competitor, increases his skill and pains-taking. It is thus that progress in all the arts is effected, and it is only thus that progress in the important art of agriculture is to be achieved.

Besides this beneficial result, these fairs would tend to diffuse information, just as our cattle shows do, by promoting intercourse between men engaged in a common pursuit, and bringing their minds into contact on subjects connected with it. Enquiry into the different processes by which results are obtained in the various branches of husbandry is thus excited, and the why and the wherefore of each are freely discussed. It cannot be otherwise than that the farmer must return from these fairs a wiser man, or if he thought that all wisdom would die with him, that this conceit must be rubbed out of him by the friction to which he has there been subjected. It often happens, for want of this intercourse among farmers, this interchange of opinions and mutual comparison of skill and intelligence, that individuals exhibit an overweening pride in respect of certain processes or products, which is not warranted by facts and is simply ridiculous. One of these self-sufficient farmers, who had always in his own estimation the best of every thing, was heard to utter the boast, when speaking of the prospects for a hay crop, "that he should have had the best in the county, if his hay seed had only caught!"

There is no denying that as a class our farmers are *set* in their opinions, whether well or ill founded, and this arises as much from their living comparatively by themselves, as from that independence

of character, which springs from their occupation. The commercial intercourse of these fairs would supply just what is wanting to many of our farmers, it would liberalize their views and enlarge the sphere of their observation, and as a necessary consequence agricultural knowledge would be advanced. Indeed these fairs would become a school for the young farmer, and for all farmers who were not too old to learn. The various breeds of stock could here be learned, their points noted, their peculiar marks of excellence ascertained and a vast amount of experience and information in regard to them gained. Trained in such a school, our farmers would become much better judges than they now are, of farm stock. And will any one pretend that it is not vital to the interests of the farmer to be able to judge of a good cow or of a good pair of working cattle, so as to be seldom disappointed in making his purchases? Should he not here as in other transactions be able to think for himself, and if need be to give a reason for his opinion? Will he not at least have more self-respect and command better the respect of others, than by a blind and haphazard way of doing his business?

The farmer needs to be well versed in the knowledge of buying and selling, and this knowledge can be acquired only by observation and the exercise of his own faculties. Many farmers fail here—they raise good crops and they harvest them in good order—but when they come to dispose of them they are at fault; they are either too early or too late in making sales, and have usually the worst end of the bargain. Now why is this? Mainly for want of practical experience in trade. The narrow round of their customers gives no opportunity for them to learn, and they go through life with but little skill in this the financial department of husbandry. The establishing of market-days, by collecting large numbers of buyers at one place, and by the competion excited thereby, would give to the farmer more tact in trading than it is possible for him now to acquire.

In the last place, these market-days or fairs would tend to concentrate New England farming upon fewer products, by making near and certain markets for them. As it is now, our farm products are too varied—we raise a little of every thing, and not enough of any one thing to make it profitable, from the expense of disposing of them. Of many articles raised on the farm, the little surplus over what is wanted for home consumption is taken to market. As a consequence, sales are uncertain and the proceeds come in by driblets. And there is at present little inducement to go largely into any one production. But create a fixed market near at hand, and our farming would at once shape itself accordingly. One farmer would take to neat stock, another to sheep and another to pigs, and they would all aim to have the best breeds, and the best animals to take to the market. Quick sales, too, would be had for them, if it was known, as it would be, when and where they were to be offered for sale. At the same market the farmer could buy what he is now forced to raise or to purchase at great disadvantage. The farmer who went into stock raising, would not be likely to raise all other farm products, as he could find them at hand, on market-day, much cheaper. There would thus be a division of agricultural labor that would be for the common

good. Few farmers in this State think of raising their own wheat, as they can buy flour much cheaper; and so it will be of many other farm products, when these markets are once established.

We have dwelt thus at length on the general advantages of regular fairs or market days, if established throughout the State; let us now consider some of the particular benefits to be derived from them. Every farmer wishes, more or less times in the year, to purchase live-stock, either young animals to keep over winter, stores to fat, milch cows to recruit his dairy, or working oxen, or a bull, or a horse, or swine, sheep or poultry. Some of these are sure to be needed by him, and he must either ride round among the surrounding farmers, or he must go to Brighton or Cambridge, to make his purchases. The former course is attended with much loss of time and vast uncertainty of finding the precise animals wanted. The latter involves much expense, and the inconvenience of making the desired purchase at a distance from home, which distance must be travelled by the animals as well as himself, to reach home.

Now, if there were a cattle fair held monthly or quarter-yearly in his neighborhood, he might at a trifling expense resort to it with the certainty or high probability of making his purchases, and he can return with them the same day to his farm. Or suppose that he has an ox which he wishes to mate, he can drive him to the fair and he may there meet with another farmer similarly situated, and thus the two are brought into a position to make some sort of a trade, which may be mutually advantageous. Now these men might have ridden about a week or more exploring barnyards and fields for an odd ox—and what farmer's experience does not illustrate the supposed case? —and perhaps be unsuccessful at last.

Again, many farmers wish to purchase in the fall young stock to keep over winter, generally heifers expected to calve in the spring. Heretofore, when cattle travelled on foot in droves to the Brighton market, they came so near their doors as to present a good opportunity for such farmers to make their purchases. But now live-stock is mostly transported to the large markets by the rail cars, and there is hardly any alternative for the farmer to make his purchases, but at these distant markets. Were local fairs or market-days established, then there would doubtless be droves of cattle purchased at the large markets at Cambridge and Brighton, and driven down to such fairs to supply the demand there. The farmer could then have his choice of such stock and at a price that while it would leave a fair profit to the drovers, would be less than he could afford to pay at a distant market. This would occur only in districts where there were not young animals enough raised, to supply the local demand.

It may be, too, that among the benefits to be derived from establishing regular fairs throughout the State, would be the encouragement they would thus indirectly give to stock husbandry, a branch of husbandry of late sadly neglected by us. The farmer is now tempted by the high prices offered, to sell his best calves at an early age to the butcher. And in fact their slaughtered carcases are brought by the cars and by steamboats from New Hampshire, Vermont and Maine, to supply the Boston market. Thus the number of neat animals

raised to maturity, has not kept up with the wants of the community, and as a consequence the price of beef animals, milch cows and working cattle, has experienced a most unprecedented increase. If the farmer could find purchasers for two-year-old heifers and steers, as readily as for calves and at corresponding prices, what should hinder his making the attempt to rear them? It will be said perhaps that he has not the fodder to keep them over winter in any numbers, without encroaching on the feed of his other stock. Now here is just where he should rouse himself to more enterprise to meet this want, especially by the cultivation of root crops. It is remarkable what immense burdens of carrots, ruta-bagas, mangel wurzels and sugar beets, can be raised on small plots of well-manured land, and with no more skill and labor than are required in the cultivation of a corn crop. The turnip-culture is often said to be the foundation of modern British husbandry. Why? Because it enables the farmers of Great Britain to raise and keep a much larger number of animals—both neat stock and sheep—than they would otherwise possibly be enabled to do, and by this means to increase the manure heaps by which to augment the capacity of the soil for future crops. We have talked a great deal about the benefits of the root culture—it forms one of the standing topics of cattle show addresses—but it has made but slow progress among us. If we would once set about it in good earnest and begin to rear young stock, we should know by actual experience the inestimable value of roots for winter feeding, and should help introduce into more general practice their culture. And the prospect of a home demand for young stock—such as would spring up from the establishing of market-days—would certainly tend to this desired result.

Again, there is a growing demand and at high prices, for good milch cows, especially for those giving rich milk, well adapted for the table and for butter. Let a regular market-day be established in their neighborhood, and an additional inducement would be offered to farmers to raise their most promising heifer calves, by the certainty of finding purchasers of their cows, just as soon as they were ready for sale; and the competition of a full attendance of purchasers would most likely create brisker sales and higher prices than would otherwise be had for them. The great question which is the best breed of cows for dairy purposes—if indeed there be one—would after a time be in a fair way to be settled. If the Jersey or the Ayrshire breed be the best adapted to our pastures and our climate, and the most to be depended upon for the dairy, it would assuredly be found out; for at a Fair where dealers and farmers thus meet together, they would compare their experiences and make up a judgment accordingly. Or if a new breed of milch cows—pure natives perchance—should be originated among us, that should meet all our requirements, that would then be the one to receive the most attention to propagate it in its purity. Why? Because quick sales, large prices and a certain market at our very doors, would operate as a stimulus to such stock raising, and it would be seen that it would pay, when we returned from the market with the proceeds.

So too we should raise our pigs, instead of being dependent, as for years we have been, on New York and Ohio for our supply, notwithstanding the disease which has proved of late so fatal to those brought from these States. The loss from this source to the farmers and drovers of Massachusetts has been immense. Can any one say, in view of such a loss, that its recurrence should not be guarded against by increasing the number of breeding sows, and making a home market for their litters by the establishing of regular markets for their sale? They can readily be taken to market in wagons fitted for the purpose, or they could be driven in droves, if grown to be shoats, and the supply, it is safe to predict, would not for a long time, if ever, exceed the demand. And here too, as in the case with milch cows, there would be greater inducements, by the establishing of such markets, to bestow more attention to breeding than has as yet been practiced among us.

Let us come now to farm products other than live stock,—how would they be affected by the establishing of these fairs? Some products, such as hay for example, would hardly be offered for sale, unless it should be pressed in bundles so as to be made available for transportation. Wherever grains were grown in any considerable quantities, they would rarely fail of finding purchasers at these fairs, for it is well known that the supply of these have not for a long time been at all adequate to the wants of the State. And it is equally well known that the Indian corn and the rye raised in New England, is far superior in quality to that imported from the Middle and Southern States—for domestic consumption, indeed, no one having tasted of the former would use the latter, unless from sheer necessity. Butter, cheese and eggs, articles that are now frequently sold at the door to travelling agents, or at country stores, and without any competition to enhance their price, would be brought to these fairs in sufficient quantities to attract purchasers for the larger markets, and sales would be made at their full value and for ready cash payment.

In regard to apples, large quantities of which are some years raised in the State, the advantage of regular market days or fairs for their sale, would be very great. As they are a bulky article, their transportation to market is no trifling affair. Six or eight barrels are usually taken at a load in a one-horse wagon, requiring on an average thirty trips to sell a crop of two hundred barrels, besides the time consumed in finding purchasers. Now if the farmer were sure that on a particular day in the fall, dealers would attend the fair in his neighborhood, and make large purchases of this fruit for shipping or for re-sale at the larger markets, he could take with him samples of his different varieties, and thus dispose of his entire crop, to be delivered at the cars or in the city, as might be agreed upon. By this comparatively small outlay of time and money, his net profit would be vastly greater than it now is. In the same manner, onions and other vegetable crops might be disposed of with advantage, both to the seller and the buyer.

And here we are reminded of an incidental advantage to be derived from these fairs, and one by no means to be overlooked in forming a

correct estimate of them. Some crops, such as the apple, for example, are extremely variable, being one year abundant in some parts and scarce in others; and another year, *vice versa*. Some crops too, such as the onion, are raised in large quantities, in some sections of the State, and not at all in other sections. Now an abundant supply of any commodity gluts the market, and often reduces prices to a ruinous extent. Hence, where there is an excess of these crops beyond the demand for home consumption, it could readily be disposed of to purchasers from a distance, who would be drawn to the local fairs by the knowledge of this very contingency.

Besides the opportunity thus afforded for traffic at these fairs, they would be attended with peculiar convenience to the farmer in hiring laborers. He is now put to great trouble and uncertainty in obtaining such as are needed—doubtless owing in part to the fact that native labor has been of late largely superseded by foreign. But even this labor cannot always be commanded at the time it is most wanted by him. He cannot spend much time in the busy season in riding round for work-people, and unless they happen to offer themselves at his door, he must suffer for want of them. Now at the opening of the spring work, at haying and at harvesting, if the farmer could be sure of meeting at the fair in his neighborhood, a large number of men in want of work, of whom he could take his pick, it would assuredly be no small convenience both to himself and to the persons hired. From this arrangement, a scale of prices, which would be highly desirable, would soon be fixed for the different kinds of laborers, and as a consequence there would be more uniformity of wages paid by our farmers. And if it were deemed expedient, a registry might be opened for the names of the persons thus seeking employment, and of the place where they last worked.

But it would be difficult to specify in detail, all the benefits, which might be expected to be derived from establishing regular fairs or market-days throughout the State. We have endeavored to enumerate but a few of them—sufficient, however, to give some definite, and it is to be hoped, favorable views in regard to them. Doubtless here, as in other new enterprises, many of the advantages would far exceed the most sanguine expectations, whilst others would in time spring up that were entirely unlooked for. Take for illustration, our railroads—many of us can remember with what distrust they were regarded by a large part of the community, when they were first proposed for consideration. The stage-coach companies thought that they should be ruined—and the farmers reasoned very naturally that the general introduction of the iron horse, as a means of transportation, would diminish if not destroy the demand for hay and other provender. But how has it turned out? The stage companies have become the proprietors of the omnibuses running from the various stopping-places of the rail cars. And for the use of those omnibuses, and for drays, coaches and private vehicles, and more recently for horse railroads, the number of horses in the State, and their price too, has probably doubled or trebled since the first rail was laid here, and the consumption of hay and oats has increased in a corresponding

ratio. Other interesting particulars will readily suggest themselves, illustrative of the incidental benefits of railroads, equally unforeseen by their projectors and the community at large.

Let us now consider some of the objections that would be likely to be urged against the establishing of these fairs. It may be said perhaps that they propose too great an innovation on the present modes of disposing of agricultural products, to meet with much favor from the farming community. We all know with what reluctance farmers quit long established habits and practices, and how slow they are to make any change in them. Nor can it be denied that a most radical change is here proposed to them, and one which needs to have a fair start given to it, in order to overcome the standing objections to every new enterprise. To take again for illustration the case of railroads, when they were first talked of, the conservative men on all sides cried out against this change from the long tried and well approved modes of travel on the public highway. Those in any way interested in keeping things as they were, joined in the cry of "let well enough alone."

"But," says J. R. Williams, in an address before the Michigan State Agricultural Society, in 1850, when speaking of the old maxim that it is best to "let well enough alone," "it depends upon what 'well enough' means. As a maxim for a farmer it is pernicious. I hold in my hand two peaches. They grew upon trees which sprung from different pits of the same original tree. This large, blushing, richly-tinted, melting, thin-skinned and small-stoned peach, is cultivated fruit. The small, woolly, tough-skinned and large-stoned peach, is the natural fruit, the 'let well enough alone' kind. I hold in my hand two apples, plucked from the same tree, one from a grafted, and one from a natural branch. One is the cultivated fruit, the other is the 'let well enough alone' kind. You perceive the distinction is as marked in the apple as in the peach. These are a type and fit illustration of progress and perfection in every branch of agriculture."

Notwithstanding the doubts of some, and the gloomy forebodings of others, the railroads were started and they who at first were most opposed to them, have been as ready as any to avail themselves of their benefits. So it would most probably be with these fairs—once started under favorable circumstances, they would give the best proof, by actual experiment, of their superiority over the present modes of selling and buying agricultural products. It would doubtless take time to turn the current of trade into the new channels—but it would come—and the wonder would then be that the work had not been undertaken long ago.

It may be objected to these fairs, too, that they are not adapted to the habits of our people—that they partake too much of the character of holidays to be favorably received by them. But, it may be asked, how can this be determined without making the trial? In fact, it is in our power to give to them just such a character as we please. And should they become the means of inducing our farmers to spend a few hours occasionally in innocent and rational recreation, it may well be questioned whether the effect on their minds or morals would be at

all injurious. It is the bow that is always bent that loses its elasticity, so the mind that is constantly intent on business and is never unstrung in social intercourse, loses its quickness of perception and its keenness of judgment; the heart that is never warmed into a genial glow of cheerfulness and pleasure, becomes cold and torpid. We should not be sorry to see as an effect of these fairs, more of the "good humor and all social affections and generous sentiments among the people," which the Constitution specially enjoins upon legislators and magistrates in all future periods of this Commonwealth to countenance and inculcate.

Other objections might be raised to an enterprise so novel and untried as this would be among us. It is not necessary, however, to go into the further consideration of them for the reason that we cannot conceive of any sufficiently serious to require it. It should be borne in mind that the practical question is, not whether there are any evils to which these fairs might be liable, but whether they would be overbalanced by the positive benefits resulting from them. And this question could best—and perhaps only, be settled by an actual experiment of establishing them. And this brings us to the consideration of the best practical method of commencing and continuing these fairs throughout the State, so as to create new markets for the farmer.

And first it would be highly desirable, if not essential, that the farmers of the Commonwealth should be more fully informed as to the working of these fairs and the advantages to be expected from them, in order to their co-operating with earnestness and energy in their establishment. If it be true—and of this it is too late to doubt—that "where there is a will there is a way," the first great object in starting this enterprise is to secure the hearty good-will—the intelligent and the united will of the farming community in its favor. This, we are persuaded, is vital to its success. With this view, meetings might be held in the winter months in the different counties, the question fully discussed and a vote taken upon it. A series of such meetings might be held in different parts of the same county, until the subject was brought before its whole agricultural population and their minds were known, with some degree of certainty, upon it. And in addition to this, circulars might be issued by the State Society, to be distributed through the County Societies, setting forth the advantages of these fairs, and requesting the opinions of those to whom they were addressed, as to the practicability of establishing such fairs in their several neighborhoods, and the times and places at which they could best be held, also desiring each person to say what part, if any, he would take in giving them his support by his attendance and otherwise. When all this had been done, we should be in a position to judge whether it were advisable to proceed in establishing the fairs, or not. If the whole popular current was decidedly against it, or such a degree of apathy and indifference was manifested in respect to it as to make its success highly doubtful, then we should say that it was best to wait for "the good time coming," rather than to attempt to force its advent. But if the public sentiment, as thus

ascertained, were favorable to the undertaking, especially if a certain enthusiasm were excited in the subject, start it then, by all means, and the sooner the better. There need be but little formality about it. Let individuals in the several neighborhoods near the fair, associate themselves together by agreeing to attend, either to buy or sell, one taking this and another that article, and all determining to lend his aid and encouragement to it. One enthusiastic person in a neighborhood—an energetic, persistent man, not easily deterred by trifles, one that sees few or no obstacles in the way when a good enterprise is started; or, seeing them, summons fresh pluck to surmount them, will certainly succeed in enlisting the hearty good-will and co-operation of nearly all with whom he comes in contact. With book and pencil in hand let him call on his neighbors and talk over the matter freely with them, and then note down what this one and that will do to help on the fair,—specifying the articles they would severally agree to carry to it. The power of associated action and the force of example, would in this way operate quietly but effectually. A few such men—young men, if they can be enlisted—will act like leaven to leaven the whole mass.

There need be no regulations made and published as to the buying and selling, not even that the sales shall be for cash payments, which would certainly be the most desirable mode of trade. The fair would be the farmers' exchange—just as the merchants have their exchange in the city—where they meet to transact business, and self-interest and mutual convenience make the bargains. Neither are there needed any public yards or buildings for the display of animals or other products of the farm; but they would be offered for sale at particular points, which would soon become well known to the public. On the 23d of June last, Sanford Howard, of the Boston Cultivator, attended a cattle fair at Kilmaurs, in Scotland. In a letter published just afterwards in that paper, he says, "there were there about four hundred head of cattle, mostly Ayrshire cows and heifers, the greater part of which changed hands, although the market was dull. They were collected in the principal street of the village, the lots of the different owners being kept separated by men and dogs. The purchasers looked over the animals, and having decided on the ones they wanted, and asked the price, made offers, at the same time extending their hands. If the offers were accepted, the parties shook hands and that consummated the transaction." The whole is a very simple affair—as simple as Columbus making the egg stand on its end—if we would but take hold in earnest and determine to have it succeed. Only make a beginning by collecting together on a fixed day and at a fixed place, agricultural products and men in sufficient numbers, and the market is established. The success of one such day would be almost sure to command success on the next, and after a few such days the market-day would become a permanent and popular institution, and would be noted in the almanac, as the different terms of the Courts are noted.

Another important question, and one requiring much care and deliberation in deciding it, is, how often and where shall these fairs be

held? It is clear that this must be left with some body of men, in whom the public have confidence. The different Agricultural Societies that receive the bounty of the Commonwealth, and are required to make an annual return to it of their transactions, might be requested to take upon themselves this duty. Composed as these societies very generally are of farmers, they have the confidence of the farmers, and they can best fix the times and places of the fairs, with the proper discretion. By their trustees, or by committees chosen for the purpose, they might exercise the necessary power with regard to the whole matter, with but little danger of its being abused. They should, in the first place, map out the county, and then select such points as would best accommodate the population, having reference to railroad and other facilities. The railroad companies could well afford to encourage the fairs, by charging but half-price to those who pass over their roads to the market. To make this matter more specific, let us take for example the County of Essex—that being the county with which the writer is most familiar—and let four towns be fixed upon as near as may be to its four corners, as the places where monthly fairs or market-days shall be held throughout the year. Such four places might be Danvers, (at the Plains,) Ipswich, Newburyport, and North Andover, (at Sutton's Mills.) Three of these towns have at least two railroads running directly to or through them; and one, Ipswich, has the Eastern Railroad passing through its center. Having settled upon these towns and the points in them, at which the market could best be held, on the first Wednesday in January let a market be held at Danvers, due notice having been given to that effect. On the second Wednesday in January let a market come off at Ipswich; the third Wednesday at Newburyport, and the fourth Wednesday at North Andover, and so go through each month in the year, observing the same order as to the days. In this way, it would soon be known that the first Wednesday of every month was market-day at Danvers, and so of the other towns, they would always have the same Wednesday in the month for their market-day. At first these markets might not be so fully attended, but still they should be observed, rain or shine, brisk times or dull. As the fairs are started, in respect of place and day, so they should be continued, for the reason that a change would be difficult; but more especially that the habit of attending a particular market at a regularly recurring time, would thus become fixed in the life of the farmer. And in order to accommodate the whole county by a larger display of stock, let some central town, such as Topsfield or Georgetown, having good railroad facilities—be the place for holding a market day for neat stock and horses in the spring and fall, the first Friday in May and October being suitable days for that purpose, and not interfering with the other markets.

And in order to encourage this whole enterprise in its infancy, it might be advisable for the Agricultural Societies or public spirited individuals to offer premiums for certain farm products, that cannot so well be presented at the regular cattle shows, and do not receive any encouragement from them. For example, the best poultry in all

its varieties, dressed for the market, mutton, pork, veal and other meats, might thus be noticed. The best lot of honey and eggs, of butter and cheese, of cranberries, quinces and apples, and of fruits and vegetables generally, might also receive the fostering aid of the societies. The advantage of this mode of bestowing premiums is, that it would be the best lot of a given product, as prepared for market and exposed to sale, that would receive them, and not the best specimens, culled and fitted for parade, as is too often the case at our fairs.

[NO. 4. NEW SERIES.]

A

PRIZE ESSAY

ON THE

PREPARATION AND APPLICATION

OF

MANURES.

BY

JOSEPH REYNOLDS, M.D.,

OF CONCORD, MASS.

BOSTON:
1858.
J. H. EASTBURN'S PRESS.

ESSAY.

In treating of the preparation and application of Manures, several other points naturally, and almost necessarily suggest themselves. In discussing their preparation, one can hardly avoid inquiring into their composition, and the sources from which their component elements are derived, and before one is prepared to apply them, he must ascertain the effects which they produce, for it is by a careful observation of these effects, that he is to be guided, rather than by rules derived from theory.

The Preparation of Manures.

In considering the best mode of preparing *any substance*, we must obviously ascertain, at the outset, of what it consists. Our first inquiry then must be, what elements are essential to constitute any substance a manure.

To this inquiry I reply,

1st. Manures

consist of carbonaceous matter already combined with oxygen, or in a condition to be combined with it, thus forming carbonic acid. Carbonaceous matter is formed by the decay or decomposition of the woody fibre of vegetables, of starch, gum, sugar, and oils, into the composition of all which, carbon largely enters. Carbon constitutes the framework, or chief bulk of all vegetables, and is left, more or less free from all other elements, in decayed vegetable substances. It constitutes the bulk of all the solid excrementitious matter, which passes through animals. Hence all ordinary manures, whether consisting of animal excrement, or of vegetable matter, in the form of muck, decayed grasses, straw, leaves, fruit, wood or other vegetable growths, are composed very largely of carbon.

2d. Salts.

Manures contain the salts of lime, potash, soda, magnesia, silex, ammonia, sulphur and iron, all of which, except ammonia, are found in vegetables, and are derived from the soil. They are all found, also, in the secretions of animals, especially in their liquid secretions, being derived by them chiefly from the vegetables on which they feed. Ammonia is abundant in animal secretions, being formed in them by the chemical union of nitrogen and hydrogen. This is an important element in many manures, as it furnishes for the use of plants, nitrogen and hydrogen, and also operates as a stimulant to their secreting and assimilating vessels.

What are called animal manures, which consist of decaying animal substances, as flesh, hair, feathers, skins, &c., yield a large quantity

of ammonia, it being formed in the process of putrefaction, by the chemical union of their nitrogen with the hydrogen of water.

3d. Gases.

Manures contain elements in the form of gases, as oxygen, hydrogen, nitrogen and their various compounds with other substances, as sulphuretted hydrogen, consisting of sulphur and hydrogen; phosphuretted hydrogen, composed of phosphorus and hydrogen; and carbonic acid, compounded of carbon and oxygen. Ammonia usually exists in manures in a gaseous form, except when combined with sulphuric or other acids.

4th. Acids.

Acids, either in a free state or combined with alkaline bases and metals, are also found in manures; as sulphuric, muriatic, nitric, phosphoric, carbonic acid, &c. These acids, with the exception of the carbonic, are seldom found in a free state, but generally in a state of combination; as sulphate of lime, nitrate of potash, phosphate of ammonia, &c.

5th. Water.

The fifth important element contained in manures, is water. This contains in solution, the earths, acids and gases. It is the universal solvent employed by nature, and is always present, when vegetable or animal growth is going on, furnishing to the vessels of the different organs, in that state of minute division, which can be obtained only by solution, the elements which they require to construct their various tissues, and not only so, but freely yielding up the oxygen and hydrogen of which itself consists, when one or both are required. These elements, viz.: carbon, alkaline salts, silex, sulphur, iron, gases, acids and water, are the elements usually found in manures. They are rarely all found in any one manure, and are found in different proportions in different manures. Hence thedifferent effects of different manures. Manure consisting chiefly of carbonaceous matters, when applied to soils containing a large percentage of humus or carbon, will produce but little effect upon the growing crop. Such a soil requires manures containing a large quantity of alkalies or nitrogenous matter. A manure consisting largely of carbon, is specially adapted to sandy loams, from which the carbon has been exhausted.

How many of the elements above named are necessary to constitute a manure?

In order to answer this question understandingly, it is necessary first to determine the condition of the soil to which it is to be applied, for that may be considered a manure, which supplies any want of the soil; and secondly, the elements specially wanted by the crop to be cultivated upon it. All the constituents above named are necessary to furnish a perfect manure; that is, a manure that shall be suited to all kinds of crops, in all kinds of soils. But were all manures so constituted, it is probable that a portion of the elements would be wasted in all cases; or, in other words, that they would not

all be wanted, in any one case. Several of these elements are volatile in their character, and of course, will not remain permanently in the soil. If they are not wanted for the immediate crop, there will be a waste of material. Could we determine, in all cases, the wants of the soil, and the wants of the crop, and then apply only those elements of manure that will meet these wants, it is obvious that a great amount of material would be saved. But the difficulties in the way of determining these wants, and of so combining and adapting the needed manurial elements, are so great, that they can never be wholly overcome, and we must be content to submit to the loss resulting from our ignorance and inability. But science and observation may do something towards meeting these difficulties. Here is a fine opportunity for the exercise of the discrimination and judgment of the cultivator.

Having now spoken of the elements contained in manures, we are prepared to speak of the sources from which they are derived, and of their preparation. Carbonaceous matter, as we have seen, results from the natural decay or chemical decomposition of vegetables. Accumulated masses of vegetables, as leaves, wood, grasses, straw, the stalks and stems of all plants, fruits, roots, grains, &c., under favorable conditions, rapidly undergo, first, the fermentative, and secondly the putrefactive process. By favorable conditions, is meant the proper degree of temperature, and the proper amount of moisture. When there is too much or too little heat, or too much or too little moisture, the process of fermentation will not go on.

When masses of vegetable matter are collected under favorable circumstances, their fibres soften and swell, and become permeable to air and water. Their salts, starch, sugar and gluten and extractive matter are dissolved; their carbon combines with oxygen, and carbonic acid is rapidly formed, and permeates the whole mass. This acid combines with the alkalies that may be present, and thus carbonates of lime, potash, soda and ammonia are formed. After a time, certain elements in the mass take on the putrefactive process. This process is due chiefly to the presence of gluten and nitrogenous elements, such as those derived from animal sources. Animal substances rapidly pass into the putrefactive process, and the larger the proportion of such substances combined with the vegetable masses, the more rapidly putrefaction occurs.

Hence the addition of a portion of animal manures to vegetable matter, greatly facilitates putrefaction and decomposition. By this process, nitrogen is set at liberty, and combines with the hydrogen of the water, or with that which it finds in a solid form in the vegetable substance, and forms ammonia, which, combining with the carbonic acid which is being rapidly evolved at the same time, forms carbonate of ammonia, the form in which ammonia is usually presented to us. Hydrogen is also rapidly developed by the putrefactive process, and combines with sulphur and phosphorus when present, forming sulphuretted and phosphuretted hydrogen, the gases which so offend our sense of smell in manures. These gases are highly volatile, and when the surfaces of the putrefying mass are freely exposed to the atmosphere, are rapidly dissipated. Some substances have the power

of absorbing a large amount of these gases, and of retaining them with considerable tenacity. Carbon itself, when nearly pure and dry, has a strong affinity for them. Hence the addition of dry pulverized charcoal or of peat, will absorb them in large quantities. From this property is derived the power of these substances, as deodorizers. The sulphates of lime, iron and zinc have a similar power. These sulphates have also the power of decomposing carbonate of ammonia, displacing the carbonic acid, and forming sulphate of ammonia, which is not volatile. Sulphuric acid, nitric acid, and chloric acid will decompose carbonate of ammonia, forming sulphate, nitrate, or chloride of ammonia, which salts are not volatile. Hence the value of these acids to combine with alkalies, and especially with ammonia, forming with them soluble salts.

The result, then, of decomposition as we usually find it, in the form of vegetable compost, is carbonaceous matter, combined with certain salts.

Vegetable substances are also decomposed in the digestive organs of animals, by a process, in many respects, similar to that which we have already described. The vegetable fibre is comminuted by the teeth, and softened and permeated by the fluids contained in the organs of the animal. A large portion of the starch, gum, sugar, gluten and salts, are dissolved out, and taken up by the lacteal vessels of the animal, to serve the purposes of nutrition. The remainder, mixed as we have said, with the juices of the animal, containing in solution various substances, is ejected. This process is accomplished much more rapidly than the ordinary process of vegetable decay, and the substance resulting is mixed with a large amount of animal matter, which fits it for rapid putrefaction. The animal matter acts the part of a leaven, which sets up the putrefactive process, whenever the necessary conditions are present. There is this difference between the reduction of vegetables by the ordinary process of composting, and by the process of animal digestion, viz.: that in the latter process, vegetables are made to afford nutriment to animals, while undergoing reduction, and yet in consequence of the condition to which they are brought, and of the additions which they receive, they are more valuable as manures, than when, without serving the purposes of nutrition, they are reduced by the former process. These two processes, vegetable composting, and the feeding of animals with vegetables, are the sources from which carbonaceous manures are chiefly obtained. But the slow decomposition of vegetables is always going on in nature, and thus one generation of plants is made to afford nutriment to those that come after it. The carbonaceous matter resulting from the decay of vegetables, is not all taken up, as it is formed. Immense masses of it have accumulated in meadows, swamps and basins, by the action of obvious causes.

These accumulations of vegetable debris, mingled with more or less of insoluble earths, constitute muck or peat, and are capable of furnishing an almost unlimited amount of carbonaceous matter, in a condition to be made rapidly subservient to the purposes of cultivation.

This material differs considerably in condition, and in composition. In some deposits, it is much more purely carbonaceous matter, than

in others. In some, the decomposition is more complete than in others. But the most important difference in different parcels of muck is, that one contains acids, or minerals combined with acids, in very sensible proportions, while another is nearly or quite free from such compounds. When acids abound in muck, it is unfit to be used in a simple state, but needs to be corrected by alkalies; and of these, lime seems to be the best adapted to remedy the evil. Quicklime mixed with peat, has the effect of rapidly rendering it pulverulent and light. Its influence seems to be extended through the whole mass, like that of yeast through the whole mass of dough, while at the same time, it neutralizes the acids, and decomposes the salts of iron or other minerals, forming salts of lime, which themselves are essential to the growth of many crops.

When muck is free, or nearly free from acids, it may be used by itself, with great profit, on light sandy soils, or on any soils, in which the humus is exhausted, or it may be composted with stable manure, ashes, guano, or animal matters, with peculiar advantage, since it has, as we have already observed, the power of absorbing and condensing the gases arising from the putrefaction of these substances, and thus will be formed a manure adapted to nearly all the uses of the garden and the field. No other substance seems so well adapted to composting with night-soil or urine as muck, since it deodorizes these substances, and retains all their valuable elements, and renders them at once manageable, and easy of application, and affords the dilution which concentrated manures require for their safe application. Composted with putrefying fish, it forms an exceedingly valuable manure. The best mode of preparing muck for use, is to throw it from its bed in the autumn, and let it be exposed to the action of the frosts of the succeeding winter. If it is designed to be composted with lime or ashes, it may be used the following season. But if it is to be composted with stable manure, night-soil, or animal matters, it is better to let it remain until the following autumn, when it should be deposited in the barn-yard or cellar, and be mixed with the droppings of the animals, from time to time. It should be provided in sufficient quantity to be used freely as a deodorizer about the premises, whenever or wherever it may be wanted. It will thus become charged with gases and salts, and be converted into a highly valuable manure, especially serviceable in garden culture.

The chief sources of carbonaceous matter are then found in vegetable composts, animal excrements, and muck, and combined with them, as we have seen, are various salts and gases. But these elements, which are equally essential to vegetable growth, either as component elements, or as stimulants, may be found in more concentrated forms, in much smaller bulk, and capable of more easy and direct application to plants. These fertilizing elements, variously combined and condensed into a small bulk, constitute what are called *artificial manures*. All plants take from the soil more or less mineral matters. Some require them in large quantities. Such plants are said to be exhausting to the soil on which they grow. The small grains, which appropriate in their culms and seeds, a large amount of silex, lime and potash, are instances of this class. Other plants take less from

the soil, and feed copiously upon the elements found in the atmosphere. The turnip and cabbage, which are furnished with a large array of leaves for this purpose, are an instance of the latter. The elements to which we now refer, are all soluble, and are dissolved and washed out of the soil by the rain, and from land that is well worked and in fine tilth they are rapidly washed out, and, unless they are supplied by artificial means, the cultivated soil becomes rapidly deprived of them. These elements may be directly and easily supplied to the soil. The nitrogenous manures, as guano, night-soil, poudrette, urine, hair, fish manure, and animal substances generally, contain in solution, or in combination with acids, a large quantity of mineral matter, chiefly lime, potash, and ammonia, and it is to these that they owe whatever permanent value they possess, their other elements being so soluble and volatile, that the effects of this class of manures are immediate and temporary.

Another kind of nitrogenous manures to which but little attention has been paid in this country, may be found worthy of attention. I refer to nitre beds, which are formed of soil mixed with potash, lime and soda, and are protected from the rain by roofs open on all sides, to expose them to the free circulation of the air. The mixture is frequently stirred to expose new surfaces to the air. The alkaline substances thus treated, combine with the nitrogen of the air, and thus in time, nitrates of lime, potash and soda, are formed, and the whole mass becomes strongly impregnated with them. The principal use that has been hitherto made of the substances thus treated, has been to leach them, by which the nitrates of potash and soda are dissolved out, and reduced to a solid state, by evaporation, for the manufacture of gunpowder, and other purposes in the arts. There can be no doubt, that large quantities of manure might be thus prepared, which would be highly valuable. Experience only can determine whether it can be done economically. But the principal means by which mineral matters are restored to the soil, is the direct application of lime, gypsum, bones, ashes, salt, sea-weed, and nitrates of lime and soda, and muriates of lime, soda and ammonia. The effects of such substances upon many soils are very apparent, especially when their application is followed by crops, into whose composition such substances largely enter, as wheat, oats, potatoes, &c.

Having spoken somewhat at length of the composition of most of the substances in common use as manures, I will speak briefly of their preparation. It has already been seen, that most of the natural manures contain elements that are soluble and volatile. It follows, of course, that when such substances are exposed to the rain and snow, the soluble elements will be dissolved and washed out, and that, if they are exposed to the free action of the atmosphere, their volatile elements will be dissipated, as fast as they are developed, and this will be, at least with respect to several of them, nearly in proportion to the elevation of the temperature. The free action of the air will not only dissipate their gases, but will carry off the moisture which is necessary to support chemical action. Hence it follows that in collecting and preparing manures for the soil, whether they consist of unmixed stable manures, or these composted with soil, muck or other

vegetable or animal substances, they should be protected from the action of the weather. There are few who can afford to submit to the loss to which they would otherwise be exposed. The barn cellar is perhaps the most convenient arrangement for the protection of manures, and this is coming rapidly into use throughout this State. The cellar should be easy of access,—should be made with a bottom impervious to water, protected from currents of air, and if possible secured from frost, so that the fermentative and putrefactive processes may be going on through the winter. Material should be provided and placed in or near the cellar, and be spread frequently over the fresh droppings of the animals, that it may absorb the liquid portions, and absorb the gases as fast as they are formed. The materials provided should be as dry as possible, that they may retain the liquid excrement, and besides, in a dry state loam and muck are more easily pulverized, and mix more thoroughly with the droppings. If the mass, thus gradually formed in the cellar, is suffered to freeze, very little decomposition or chemical action take place during the winter. But if the frost is kept out, the laboratory will be at work more or less actively, through the entire winter, and the manure will be fit to be used in the early spring. It will become softened and rendered fine, by its own internal action, and will not require to be overhauled, for the sake of breaking and pulverizing it. Whereas, if it is kept frozen, or near the freezing point, the animal excrement will be in the condition of green manure, and will not so readily combine with the soil, or act so immediately upon the growing crops.

The farmer who has no cellar, should cover his manure with a roof, at least, to protect it from the rain and sun. It would be well for the farmer who does not cover his manure, to remove it during the winter, into his field, and deposit it in as large masses as possible, that it may present the smallest surface to the weather, and cover it neatly with soil, that may protect it from the rain, and absorb the gases as fast as they are formed, which will be very slowly during the cold weather. A quantity of dried muck may be provided in the autumn, near where it is intended to deposit the manure from the barn, and be mixed with it as it is deposited, and used to cover the heap. Heaps of compost thus prepared, require to be overhauled in the early spring, and the ingredients to be well mixed. It is an excellent practice to mix with them, as they are being overhauled, gypsum, or a solution of sulphate of iron, or diluted sulphuric acid, as these will combine with, and retain the ammonia, as it is formed in the fermenting mass. Ashes or quicklime should never be directly combined with green manure, or urine, or any substance, as guano, for example, which contains a large amount of carbonate of ammonia, as they will combine with the carbonic acid, and set free the ammonia in a gaseous form, which, unless some other substance having a strong affinity for it, is present, to combine with it, will of course be lost. When it is desirable to apply lime or ashes to the same soil with stable manure, or compost consisting partly of stable manure, the best method probably is, to plough in the manure, and spread the lime or ashes broadcast over the surface, or apply it in the hill with the seed, when hoed crops are to be cultivated. The principle, which should

ever be kept in view, in the preparation and application of manures, is, that they should be applied to the soil in their integrity, that is, containing all the elements belonging to their constitution. If a portion of these elements are diffused into the atmosphere instead of the soil, it is obvious that a portion has been lost, and that portion is usually the most active and the most stimulating. Some persons prefer to introduce stable manures into the soil, in a crude or green state. In this condition it is in a state of integrity, and all its elements, as they are developed, are absorbed by the soil, and we are not surprised that those who have never experienced the advantages of composting in a cellar, should prefer this mode of application.

We have already referred to the combination of muck with night-soil. Probably there is no better mode of preparing this highly valuable substance for common use, as a manure, than by mixing it with a sufficient quantity of muck in a dry state, to absorb its moisture, and destroy its odor. If a quantity of plaster, or a little diluted sulphuric acid be added to this composition, we shall have one of the best manures that can be composed, for most crops, and especially for garden and fruit crops.

Liquid Manures.

The saving and use of liquid manures is deserving of more attention than it has yet received in this country. It is easy so to arrange the stalls of cattle, as to receive their urine into troughs under the floor, and to convey it into a cistern in the cellar, or outside of the barn. This may be pumped into a water-cart, to which a sprinkler is attached, similar to those used in watering the streets. If it is pumped in through a strainer, the sprinkler does not become clogged, and it may be rapidly conveyed to the field, and distributed as a top-dressing, upon grass or grain, with immediate effect. When the soil is not deficient in carbonaceous elements, there can probably be no better top-dressing applied. It is not as permanent in its effects as the solid excrement, but more immediate, and it may be applied twice a year upon grass, with less expense of labor than one dressing of solid manure. The cost of the necessary apparatus for saving and distributing it, is small. As a top-dressing for a field where turnips are to be grown, it is very excellent. As a top-dressing in the spring, or during the summer, for pasture lands, it is perhaps superior to any dressing that can be applied. If the undiluted urine is thought too strong, it may be easily diluted in the field, if water is at hand. A gentleman of my acquaintance, who has been using it as a top-dressing for grass, during the three years past, considers it fully equal in value to the solid excrement of the same animals, and he states that one man can dress as much land in this way, in one day, as two men can, with solid manure, in two days, without taking into account the expense and labor of collecting and mixing the material of which compost is made. If this statement be correct, it must be more economical than any compost, as a dressing. When applied to land in which humus is deficient, it will not probably be found to meet all the wants of the crops. Its effects will be much like those of guano, on similar soils. It remains to be determined by experience whether

it is of equal value with superphosphate of lime, ashes, plaster, guano, or other concentrated manures, as a top-dressing. These may all be applied with equal facility, and with even less labor, and some of them, as ashes and lime, are more permanent in their effects. In applying liquid manure as a top-dressing, the labor of one man and horse will top-dress an acre in a day, within a quarter of a mile of the barn. This would be worth not far from three dollars. Will that value of any other dressing add as much to the amount of the grass or grain crop as will the dressing in question? This must be determined by experiment. English farmers are making extensive application of liquid manures. They apply them largely diluted, and the effects may be due, in some measure, to the quantity of water in which they are dissolved.

Liquid manures may be applied so strong as to injure tender plants. It is well known that guano applied directly to the germinating seed, operates as a caustic upon its softened substance, and entirely prevents its growth. The same thing is true of ashes and lime under certain circumstances, and it is also true of urine; for when this is applied in large quantity, upon young and tender grass, it will often kill it entirely. There is no doubt that the English mode of application is much the safest, but in order to attain the same result, the labor is much increased; and we are hardly prepared to believe that the fertilizing power is increased in proportion to the dilution, as is said to be the case with the medicinal power of homœopathic medicines. Within certain limits, the immediate effects of fertilizers may be, and doubtless are increased by dilution. The particles of soluble bodies are more finely subdivided, and are more readily taken up by the radicles of plants, and carried into the circulation. Indeed, this is doubtless the principal reason why liquid manures are more immediately active than solid. Water must always be present to render manure of any kind effective. Potash, lime, soda and all other salts, must be in a state of solution, before they can be absorbed by the rootlets of plants. Horticulturists well understand that all such substances can be applied with more immediate effect, in a state of free solution. Such substances, applied in a solid form to the soil, in a season of drought, have little or no effect, until the falling rain dissolves them, when they will sometimes operate with almost magical effect. Guano applied as a top-dressing, is sometimes almost wholly inoperative, unless the application is followed by rain. Hence, when this fertilizer is applied in this way, it should be applied in the early spring, while the ground is still wet, or during a rain, or upon an April snow, in order that it may be dissolved and carried into the ground, and thus be protected from the atmosphere, as well as be applied to the roots of the grass and grain. There can be no doubt that lime and ashes applied in the form of lime-water and weak lye, would be more immediately efficacious, than when applied in the ordinary way. But it would be attended with more labor and expense. How far this mode of applying manures will be found economical in this State, where labor absorbs so large a part of the working capital of the cultivator, each must judge for himself.

Our own opinion is, that with the exception of urine from the stable and the house, which may be easily saved, and which is apt to be lost, in great measure at least, by any other mode of management, the application of liquid manures will be confined chiefly to the garden. For garden uses, soap-suds and the sewage of the house is usually sufficient to fertilize a garden that will supply the family with vegetables. All the liquids from the house should be conducted to a reservoir. A garden-engine, or a hand water-cart, with a few feet of hose and a sprinkler attached to it, will afford all the machinery needed. The soil may be well sprinkled before the seed is sown, and at such times subsequently, during the growing season, as may be convenient or necessary. A little practice will soon teach the needful skill in the application. If plaster or a solution of sulphate of iron is occasionally added to the reservoir, it will both act as a deodorizer, and add to the efficacy of the manure. Much excellent manure might be prepared in this way, if every farmer, and every family cultivating a garden, would take the pains necessary to provide a suitable reservoir. The material that now runs to waste, and is, for the most part, a nuisance around our premises, might thus be made to add no inconsiderable amount to the products of our soil. Every family in a country town of five hundred families, might save manure to the amount of five dollars annually. This would amount to twenty-five hundred dollars, or one dollar for each individual in town. This would be sufficient to pay the highway tax, and build one good school-house every year; or it would pay the entire school tax of most towns of that number of inhabitants. This amount of manure, properly applied, would produce five thousand bushels of corn or vegetables of equal value. If such would be the value of this saving to a single town of five hundred families, the value to the whole State would be a very large sum.

In our discussion thus far, we have had direct reference to natural manures, but we have introduced several observations relating to the composition and use of artificial manures. Most of these manures, as they are received from the manufactories, need little or no preparation, but are ready to be applied directly to the soil, or to be composted with other manures, or to be dissolved for use in a liquid form. It is not probable that they can be economically prepared, except upon a large scale, at establishments erected for the special purpose, and by machinery suited to the manipulations to which the ingredients are to be subjected. Superphosphate of lime consists of ground bones, supplied with an additional dose of oxygen by means of sulphuric acid and water. Blood manures consist of blood and animal fibre deodorized by substances capable of absorbing their nitrogen, sulphuretted hydrogen and moisture. Muriate of lime is either the waste of bleacheries, or more commonly, burned shells or quicklime treated with sea water, which imparts to the lime its salts, and a certain amount of muriatic acid. But as the farmer will not be likely to undertake the preparation of these and similar manures upon his own premises, it is unnecessary to go into a description of the machinery or processes used in their manufacture.

The Application of Manures.

We have already said so much upon the application of manures, while treating of their preparation, that the reader will very naturally expect, and probably hope that this division of our subject will be very briefly disposed of. But before giving any directions respecting the application of manures, we must first institute an inquiry into the effects produced by manures upon growing vegetables, and upon the soil.

Were the theory correct, that vegetables derive all their nutriment from the atmosphere, the application of manures to the soil would be of no advantage to them, unless it were to stimulate them to drink up the carbonic acid and the hydrogen, and in some cases the nitrogen of the atmosphere, more eagerly. But experience everywhere teaches us, that the free application of manures causes vegetables to grow with much more vigor, and to attain a much more perfect development. The obvious inference from this fact is, that manures furnish to plants the elements of nutrition, which they eagerly devour, and appropriate to their growth. We know that in animals the food is received into the stomach, where it undergoes a sort of solution, and is then carried forward into the intestines, where it is presented to the mouths of myriads of little vessels, which drink up the fluid portion, and convey it to larger vessels, by which it is conveyed to the heart. Then by the heart, it is sent into the lungs, where it is acted upon by the air, in the lung-cells, and is then returned to the heart, and by means of the arteries, sent to the various tissue-forming vessels throughout the body. The blood in the arteries is apparently a homogeneous fluid, but is in fact, a very compound fluid, containing in solution, various elements that previously existed in the food. The tissue-forming or assimilating vessels are endowed with the wonderful power of selecting from the compound mass presented to them, such elements as they need for their respective purposes, and of rejecting the remainder. From the materials selected, they build their several structures, and repair the waste that is constantly going on in them. Thus one set of vessels forms bone, another muscular fibre, another skin, another hair, &c. Other vessels from the same circulating fluid, eliminate the various fluids contained in the body, as serum, milk, urine, &c: We know also that a circulating system in many respects similar, exists in vegetables, and that fluids drunk in by the hair-like radicles by which their roots are covered, are conveyed upward, in vessels arranged for this special purpose, and that when they have passed through the trunk, they are distributed to the leaves. The fluid passing upward from the spongioles to the leaves, is called the ascending sap. In the leaf, the sap is acted upon by the elements contained in the atmosphere. It then becomes the descending sap, and is presented to the various tissue-forming vessels in all parts of vegetables. It is now apparently homogeneous, but in truth exceedingly compound, containing the various bodies in solution, which were drunk up by the radicles, and which have been absorbed from the atmosphere, by the leaves.

The vessels of vegetables have the same wonderful, and seemingly intelligent power of selection, that exists in the vessels of animals. They are thus enabled to select from the compound circulating sap, what each set of vessels requires, to construct the tissue which each has in charge. One set selects materials for the alburnum, another for the bark, another for the leaf and the leaf-bud; another forms the fruit-bud, and ultimately builds up the fruit. One set constructs the woody fibre, another set the starch, another the gum, another the resin, another the bitter principle, another the sweet and nutritious juices, another the poisonous elements. One set forms from the sap, the coloring matter that blushes or glows in the petals of the flowers, and the coverings of the fruit. Another selects, atom by atom, the lime that enters into the composition of the grain of wheat; another set weaves the covering for this same grain, from the woody fibre. Another set deposits the fatty elements, and arranges them in layers, around the starch and sugar and lime, of which the kernel of corn is built up. Thus every tissue and every product of vegetable life, are formed by innumerable vessels, from the descending sap.

This sap must contain, then, all the elements required to form all the various vegetable tissues, and for their rapid and perfect development,—the supply must be abundant—must be in due proportion, and must be furnished at the time when it is required by the formative vessels. An animal fed upon sugar alone or upon starch alone, will soon starve and die. The various vessels cannot obtain the materials necessary to carry on their work. So if a plant is furnished with only one element of nutrition, it will cease to thrive, or at least, only those vessels that are supplied by this element, will carry on their proper work. For example, certain vegetables supplied with an abundance of nitrogenous manure, will produce an exuberant growth of woody fibre—of stalk—of leaf; and but little or no fruit or seed.

We are now prepared to understand somewhat more clearly the effects of manures upon vegetable growth.

And first—manures furnish to the sap-vessels the various elements which they need for the construction of the various vegetable tissues, in such a state of minute subdivision, that they can take up atom by atom, what each requires. All the elements existing in the soil, furnish their respective quotas to the compound substance constituting the sap. Some of these elements are capable of solution in the water in the soil. Others are incapable of direct solution, and without the presence of some other element capable of either acting upon them, and thus rendering them soluble, or of combining with the solvent, and imparting to it a higher power of solution, they would remain inert in the soil. Thus silex is insoluble in simple water, but the presence of lime or potash in the solvent, gives rise to a new action, and silicate of lime or potash is formed, which is soluble, and thus becomes an ingredient in the sap. Silex is an important constituent in the epidermis of several of the grasses, and of the straw of grain, and the stalk of corn. When such plants do not contain a sufficient supply of silex in their outer coats, they break down under their own weight, and lodge on the ground, before they have attained their full

growth. This we often witness in clover and herds-grass, and oats, upon reclaimed meadows and swamps. In such cases, a top-dressing of sand or gravel will impart to the growing stalk, the next season, sufficient hardness to enable it to stand erect, until its growth is completed. In such cases, even if lime and potash are not directly essential to the growth of plants, they contribute indirectly an important service. This instance affords a beautiful illustration of the chemical action that is constantly going on in the soil.

Different soils require different treatment. Clay soils should be treated with lime, ashes, and light composts; such as contain straw and partially decomposed vegetable matters, keep such soils light, and furnish, by their decomposition, the humus in which they are deficient. Black, moist soils, that have been long cultivated, are generally exhausted of the lime and silex needed for grass and grain crops. Hence compost containing sand is especially useful on such soils. Lime may be applied freely upon the surface of such soils, in the form of slaked lime, plaster, or superphosphate, with advantage. On light, sandy soils, well worked composts, rendered as fine as possible, and containing a large proportion of muck or other carbonaceous substances, and animal manures, of all sorts, are peculiarly appropriate. The influence of animal manures upon sandy soils, is well illustrated by the growth of corn and melons upon the sands of Cape Cod, by means of fish offal, and prepared fish manures. Such soils are hungry for the elements which these manures contain. Whatever manures are applied to such soils, should be well mixed with the soil, and well covered in.

Should manures be deeply covered in the soil, or should they be applied near the surface, are questions about which cultivators differ. The depth to which manures should be covered, will depend upon three circumstances, the nature of the soil, the kind of manure, and the kind of crop. All manures should be placed at a sufficient depth in the soil to keep them moist, or they will be inactive. When a soil is naturally moist and heavy, it is not necessary to bury manure as deep, to insure its being kept in a moist state, as when it is light and dry. Manures containing a large proportion of volatile elements, should be buried deeply. These elements, when the soil becomes warm, assume the gaseous form, and tend to rise to the surface, and will be diffused through the soil lying over them, and, if there are elements in the soil having an affinity for them, will be retained. Other elements, which are not volatile, as lime, ashes, salt, &c., but which are soluble in water, may be safely applied on or near the surface, and will be dissolved by the rain, and carried into the soil. Some vegetables strike their roots deeply into the soil, and for their perfect development require a deep tilth. In such instances, trenching is peculiarly advantageous. For such crops, manures should be worked as deeply as possible. In preparing a garden soil, it is good practice, to spread on the surface a coating of manure, and plough it in deeply, and then to add a dressing of fine compost or liquid manure, and work it in with the harrow or rake; thus the plant will find nutriment at every stage of its growth. For potatoes, it is not necessary to bury the manure so deeply, as they grow near the surface.

The same is true of the flat turnip. The question has been often asked, how can manure be best applied for the corn crop;—shall it all be put upon the soil before ploughing, and be ploughed in deeply, or shall a portion of it be applied in the hill, or near the surface? When corn is to be grown on newly turned grass land, shall the manure be spread upon the grass, and turned under the sod? This is certainly the easiest way of applying it, and many contend that when it is applied in this way, although the corn may not be as vigorous in the early part of the season, yet in the latter part, when the roots have struck through the rotting sod, and found the manure deposited beneath, it will grow with sufficient vigor to make up for the time lost in the early part of the season. Others contend that it is better to turn over the soil in the autumn, and in the spring work in the manure upon the surface of the furrows, with the harrow or cultivator. In this way, it is said the corn will get a vigorous start in the early season, and when its roots strike into the mellow sod, they will find nourishment sufficient to sustain their growth.

In answer to both these positions, we reply, that the largest growth of corn that we have ever seen, was produced by a combination of the two methods. Two-thirds of the manure, say sixteen loads to the acre, were spread upon the sward, in the spring. This was then turned over to a good depth. The harrow was vigorously applied; and after this, furrows were made for the rows with a light plough. Then the other third, say eight loads, was put into the furrows and the kernels dropped ten inches apart. This gave the corn an early start, and it grew vigorously from the commencement, and its roots soon found the rich nutriment deposited below the sod. The crop in this case was one hundred and four bushels to the acre.

Practical men differ about the proper mode of applying manures in the culture of corn. As the corn crop is perhaps the most important crop to the country—is in fact the national crop, this is a subject of great importance. But it is questionable whether any rule of universal application can be given. We think that different soils may require different methods of application.

In a clayey, heavy soil, it is important that the management should be such as to render the whole soil warm and light. To accomplish this end, a large portion of the manure should be incorporated with the soil by the plough. We think green manures on soils of this description should be used for this purpose. But as this soil, unless underdrained, is cold, and does not set the crop forward early, something more is needed. A small quantity of well composted manure in the hill, meets this deficiency. This process is attended with labor and expense, but we think these are fully repaid by the result. Indeed in such soils, without the use of such means, the crop is uncertain unless the season is favorable. In light, warm soils, the whole of the manure may be worked into the soil with safety, and perhaps with more advantage to the soil, if the object is to prepare it for future crops. In any soil, if the chief purpose is to improve it, and prepare it for grass, grain or other crops, as speedily as possible, and the corn crop is a secondary object, the whole amount of barn manure should be thoroughly incorporated with the soil, and a little guano or

other nitrogenous manure put into the hill, to serve as a stimulus to the corn crop. In this way, when the soil is cold and tenacious, a good corn crop may be secured, and the soil rapidly prepared for future use. The stimulant will be expended on the corn crop, and will contribute little or nothing to the permanent improvement of the land. For this we must depend wholly, so far as manures are concerned, upon the stable and compost manures. But we think the corn crop is of sufficient importance to be considered a primary crop, and that the mode of applying the manure in all cases, should be such as to insure a good crop, while at the same time the permanent improvement of the soil is secured. These objects are by no means incompatible, and may both be attained at the same time, and by the same process. In the culture of corn, manures should be liberally applied. There is less labor and less expense in raising sixty bushels of corn on one acre than on two, and in the former case the land will be left in a better condition than in the latter.

One great necessity for applying manure in our climate, is, that plants may be forced more rapidly through all the stages of their growth, since if left to themselves, the season would not be long enough to bring them to perfection; and that system of culture which pushes them forward early, that they may get well rooted, and therefore be the better able to endure the droughts of July and August, and thus arrive at early maturity, before the frosts of September, we think must be the best system. Could we add another month to the summer of our climate, we could cultivate many crops, with a much less amount of stimulants than we require at present. Now we have to guard against the droughts of summer, and the early frosts of autumn, and I do not esteem it safe practice, to deposit the manure for the corn so deep in the soil that the growing crops cannot reach it till late in the season. When stable manure or compost is ploughed in deep, we would recommend the application of well diluted guano ashes or fine compost in the hill. In this way, with a season at all favorable, the crop will rarely fail.

As a general rule, we would say that all compost should be well worked over in the early spring, before the weather becomes sufficiently warm to occasion a rapid development of the gases, and rendered as fine as possible. If the heap is too wet to work fine, a sufficient quantity of dry soil, or peat, or charcoal pulverized, or plaster should be added, to absorb the moisture and destroy the tenacity of the mass. All manures should be applied in as fine a state as is possible, without too much exposure to the action of the atmosphere. If manures are reduced in cool weather, when they are not in a state of active fermentation, it may be done without great loss of their gases. All manures that are to be applied to the surface should be pulverized as finely as possible. Some plants spread their roots near the surface, as the strawberry, and the whole family of the cucurbitacea. These especially require finely reduced manure. When manures are to be buried deeply in the soil, this mode of preparation is less absolutely necessary. All manures, whether applied in a coarse or fine state, should be immediately covered under the soil, that as much as possible of their volatile elements may be absorbed by the

soil. These elements, as we have already said, permeate the soil, and divide its particles, and render them light and easily traversed by the delicate rootlets. This mechanical effect is one of no small importance. A soil rendered light and porous by fermenting manure, is as much better for the operation, as bread risen by yeast is better than a mass of dough.

It is the general practice of our cultivators to apply manures but once in the season. But certain manures may be applied more than once, with much profit, provided they are applied during the growing stage of the plants, and in such a form, as to mingle at once with the soil, and become a constituent part of it. It must be either finely pulverized or in a liquid state. In either form it should be immediately worked into the soil in the immediate vicinity of the plants, with the rake or hoe. Many plants, including most of the smaller fruits, may be treated in this way, with good results. We have already seen that manures may be applied several times during the season to grasses, thus enabling us to take two or three crops or cuttings in a year. This is of great value in soiling cattle, as it enables us to supply them with green and succulent food during the entire summer and autumn from the same ground.

Did we understand more perfectly the chemical constitution of all the plants which we cultivate, we might doubtless, in many cases, supply to the soil the elements especially needed by the plants. But we do not anticipate any very important results from the doctrine of specific manures, considered by itself. Grapes appropriate a large amount of lime and potash. Asparagus, a marine plant originally, appropriates marine salts. But we cannot depend upon lime and potash to give us luxuriant grapes, nor upon marine salts alone for large and succulent asparagus. They both require in addition to these substances, a generous supply of the same elements of nutrition that other plants require. Onr discussion has already prolonged itself much beyond our expectation, and we will not go into the subject of the application of this class of manures; and will merely remark that the subject is but imperfectly understood, and that much experimental research is needed to guide us in their application, to any certain results.

Nature works out from a few simple elements variously combined, the wonderful variety of products exhibited by vegetable life. If left to herself, she always obtains a supply of these elements. But when disturbed in her operations by short-sighted man, who removes from the soil its productions for his own use, instead of leaving them to decay where they grow, the soil becomes exhausted of necessary elements, and unless they are returned to it in the form of manures, she soon becomes unable to complete the processes which she commences, for want of material. The plant is not perfect. Its framework is not fully developed, or its seed does not reach a perfect form, or does not arrive at maturity. The crop becomes annually smaller, because the needful elements are annually diminishing. In the older Western States, we are told that the wheat crops have diminished from one-fourth to one-third in quantity, per acre; and unless the elements that have been removed from the soil, are returned to it, the

crop will continue to diminish in a still more rapid ratio, until it ceases to be a remunerative crop. In Eastern Virginia and Maryland the soils that formerly yielded thirty bushels of wheat now yield five or six, and are being deserted because their produce will not sustain their cultivators. Guano has been applied to such soils. The nitrogen and phosphates and alkalies which it contains, render soluble certain elements still found in the soil; and one or two crops of ten or twelve bushels, have been taken from the soil. But this process will soon cease, and the soil be left more perfectly exhausted than before. Portions of this soil are being treated in a different way, by cultivators of market vegetables, who are applying muck, stable manure, lime, leached ashes, green crops, and whatever will restore to the soil, in the most permanent form, the elements required by such vegetables.

Hundreds of acres may now be found covered with thrifty crops of strawberries, gooseberries, currants, celery, radishes, turnips, beets, onions, melons, and similar crops, which a few years ago did not repay the labor of cultivation. The favorable climate and the convenient market render such cultivation highly remunerative. The neighboring cities furnish the means of restoring to the soil the elements needed to sustain the large draught made upon it. The outlay for manures in this case is large, and for grain culture probably would not pay. But it shows in a striking manner what manures may accomplish. There is a vast amount of manurial substance produced in all cities, the largest part of which is annually wasted. If it could be carefully collected and judiciously applied to the soils in their vicinity, it would wonderfully increase their productiveness. But the transportation of manures to the soil to be cultivated, is an expensive operation, and will prove economical only within certain limits and for certain purposes. The true system of farming in this State is undoubtedly to consume upon the farm so much vegetable matter, that the solid and liquid animal excrement resulting, applied either simple or composted with other suitable materials, shall enable the farmer steadily to increase his crops, while at the same time, his soil shall be as steadily growing richer, and more productive. Every acre cultivated, should be left in better condition after the crop is taken off, than it was when it was put on. To attain this point, no more land should be cultivated, than can be done without exhausting it. The good teamster will keep his horses or oxen at work steadily, without diminishing their flesh or strength. Every one who has had experience will affirm that it is the most profitable to keep his team in high condition. The same thing is true of the soil. If the good teamster has food for only two horses, he will not attempt to keep three. So the judicious farmer will cultivate no more acres than he can feed well. In most instances it is better and more profitable, and attended with less labor, to raise sixty bushels of corn on one acre, than on two. The soil in the former acre is left in a better condition, and in a better state for any succeeding crop than in the latter.

We think that in general, the farmers in this State must rely upon their own farms, for their permanent supply of manures. Imported manures and artificial manures may occasionally be resorted to, as

temporary expedients. But unless the produce can be sold at a near market and a high price, their use will not be found economical in the long run. But although we think every farmer should rely upon his own farm, he may with propriety avail himself of such natural sources of supply as his own neighborhood affords. The cultivator upon the sea-shore may and ought to use the substances thrown at his feet by the waves. Fish and fish offal are a resource of great value to those within its reach. If combined with peat as a deodorizer, during the process of putrefaction, it may be used without inconvenience. Marl beds are so many mines of wealth to cultivators in their neighborhood. In the vicinity of soap works, every one will be eager to avail himself of the leached ashes. The woolen factory affords wool waste, an article of great value as a fertilizer. Various manufacturing establishments, as glue-making, tanning, gas-making, &c., furnish waste material that may be obtained by farmers in their vicinity, at a remunerative price. Every opportunity to obtain these and similar materials, to add to the manure prepared in his own laboratory, will be improved by the enterprising farmer.

There is one other means of reclaiming and fertilizing an exhausted soil, to which we have barely alluded, which we think is worthy of more attention than it has of late received, especially upon light sandy soils, at a distance from the farm, or from extra sources of supply, we mean the ploughing in of green crops. The best crops for this purpose are clover and buckwheat. Let the soil be ploughed five or six inches deep, and seeded with buckwheat, early in the season; and in July, or as soon as it is in full blossom, let it be turned in, seven inches, and immediately seeded again, and it will give a second crop which may be ploughed in, in September. Let this be turned in, and clover sowed and harrowed in, and the next season this will afford a good dressing, which will prepare the soil for a crop of rye, which should be sowed in the latter part of August, or early in September. If grass seed is sowed with the rye, lands thus treated will yield good pasturage, for three or four years, after the crop of rye is taken off, when the same process may be repeated. This process has been found an effectual means of restoring exhausted pine lands, and in cases where it is not preferred to renew the growth of wood, may be resorted to with economy and success.

We have now spoken of the principles which should guide us in the preparation and application of manures. We have also spoken of the elements which enter into the composition of the principal manures found in use in our State. The quantities of the several kinds which may be most profitably applied, must depend upon the circumstances of each case. These circumstances include the nature and condition of the soil, the kind of crop, and the character of the manure. When manures are carbonaceous and not volatile, they may be applied in large quantities at a time, and their effects will be permanent. When manures consist largely of volatile elements, it is a better rule to apply annually or oftener, in such quantities as are needed for immediate effect. Such manures cannot be depended upon for the permanent improvement of the soil, for their active properties are soon converted into gases, and lost. Their power is expended in the

growth of the present crop. Hence they should be applied only with reference to this crop, and in such quantities as its wants require. The quantity of any kind of manure must be determined by observation and experience. The judgment and skill of the farmer are to be his guides in this matter. There has been undoubtedly a disposition to cultivate too much land,—to spread our manures over too large a surface. When the soil was new, this answered tolerably well, and good crops were obtained for a time; but many of our farms have in this way become exhausted. As the soil becomes exhausted, by repeated cropping, of the fertilizing elements which had been stored up in it, the injurious effect of this treatment becomes more and more apparent. Men are slow to renounce the usages that were established in former times, and under different circumstances. They hesitate to give up allegiance to custom, in agriculture, as in other things, and pursue practices of ruinous tendency merely because they are sanctioned by authority. Needed reformations are seldom inaugurated until they are compelled by necessity. But many of our most intelligent cultivators have commenced the work of reform, and when we shall all, in every part of the State, so cultivate our lands that they shall become more fertile and more productive after every successive crop, we shall have learned the only true and economical method of applying manures.

[NO. 5.
NEW SERIES.]

A

PRIZE ESSAY

ON

AGRICULTURAL EDUCATION.

BY
WILSON FLAGG,
OF ANDOVER, MASS.

BOSTON:
1858.
J. H. EASTBURN'S PRESS.

ESSAY.

"*The most useful system of agricultural instruction, by which to acquire a practical agricultural education, such as would fit a young man to commence the business of a farmer, upon the average of farming lands in Massachusetts.*"

It will be assumed, at the commencement of this essay, that it is desirable that the farmers of Massachusetts should continue, as they are now, a class of independent working-men, and proprietors of the lands they occupy and cultivate. If we look about the country, we find individuals who own from one hundred to three hundred acres of land, who are industrious and able-bodied men, and intelligent citizens. They are capable town officers and good public servants in a variety of civil capacities. They are, also, proficient in practical agriculture, and are liberal and progressive in their ideas of their own business. Such men represent the standard to which we ought to strive to elevate the whole class of farm-proprietors. They should possess skill, hardihood and industry, because on these qualities depends their thrift; they should be well educated and intelligent, or they cannot preserve their independence.

There is no object, therefore, more deserving the attention of those who are directly, or indirectly, the guardians of the public interest, than the education of young men who are engaged in the pursuits of agriculture. At the outset, however, we are met by the objection, that the surest means of causing a young man to quit his paternal acres and enter into other business, is to give him a superior education. This is not to be regarded as proof that knowledge gives one a distaste for rural occupations, but rather, that it affords him the capacity to earn a livelihood in an easier and more eligible way. A farmer's employments are laborious, comparatively unsocial and unstimulating to the ambition, and they do not lead rapidly to wealth. If, therefore, the son of a farmer has received a better education than the generality of his fellow-citizens, he leaves the farm, not always from a dislike to it, but, because he can more easily obtain wealth by the exercise of his wits, and by the use of his acquisitions, than by working in the field.

Men will not voluntarily pursue a laborious occupation, if their education and habits have fitted them for an intellectual or sedentary one which is attainable. Hence, if we qualify those young men who are to be devoted to agriculture, by a superior education, to earn an easy livelihood in some more eligible pursuit, we do that which will entice them away from the farm. Their attainments flatter them with at least the hope of success in other departments of business, and they will be led by this illusion to neglect, if not to leave their

early chosen pursuit. But we are not to conclude from these circumstances, that this class of young men must be kept in ignorance; we are rather to infer that their education and discipline should be peculiar. Our present object, therefore, is to consider the means that could be most advantageously used for instructing young men in the science and practice of agriculture, without lessening their attachment to the occupations of the farm, or creating inducements for seeking their fortune in other ways.

In order to train young men to be good and persistent farmers, they must be better qualified to succeed in farming than in any other business; but we can only approximate towards any system of education devised for this purpose, and the greater number of its appliances must be indirect. If we cannot create agricultural schools and colleges; if we cannot, except to a very limited extent, furnish direct instruction to the youth of the rural classes — we may, nevertheless, supply them with new motives to make use of the opportunities they possess for acquiring knowledge; we may inspire them with ambition to be skilful farmers, by making the farm their pride; we may induce them to put forth more energy in their occupation, by showing them how it may be made more profitable. Every young man is seized with a passion to become proficient in his business, as soon as he discovers that by skilful practice it may be made a source of wealth; while on the other hand, he cares not to learn or to pursue an employment which cannot afford him the gratification of his wishes.

It should be premised, if, indeed, it be not too obvious a principle to be mentioned, that the grand motive to follow any pursuit that requires patient labor and industry, while it holds out no tempting prizes to the ambition, is necessity. One obstacle to the improvement of agriculture in this country is undoubtedly the absence of an absolute necessity, on the part of any class of our inhabitants, to devote themselves permanently to farming. Neither has there existed an actual necessity for the exercise of a great deal of practical knowledge, or skill, in the occupation. When a farm has been exhausted of its fertility, the owner has perceived that it would be more profitable to sell the old farm and buy one that is new and unimpaired, than to endeavor to improve, or regenerate, the old one. The art of farming in America has been, to a great extent, that of buying and clearing new lands, and using the natural productiveness of the soil to the best advantage for the present time.

As population increases, and as the wild lands become exhausted, there will arise a necessity for the art of regenerating old farms and worn-out soils, instead of making the best present use of new and productive lands. This necessity has in a considerable degree already come upon the inhabitants of the Eastern States. But there are still so many avenues of employment open to young men, presenting them superior or more tempting inducements than the humble prizes which are offered by farming, that the growth of a strictly agricultural class must for many years be moderate. A young man will not consent to build stone wall or hoe corn in one field, while an adjoining one offers him an opportunity of digging for gold. The prosperity of agriculture would soon follow the concurrence of such circumstances

as would render the business a matter of choice to those who were bred to it. By this we mean a state of things that should make it apparent to every intelligent young man who has learned farming, that he could not choose a wiser course for his own interest and happiness, than to devote himself entirely to this pursuit.

It is wise, however, to anticipate this period, and while millions of acres in the State are lying unimproved, to take such steps and use such measures as shall induce a sufficient proportion of our youth to become good practical farmers, instead of seeking their fortune in the whirlpool of trade and manufactures. For the furtherance of this end, the most important requisite is to afford the younger portion of the rural classes such an education as shall so admirably fit them for agriculture, that their own pride in the excellence of their skill shall induce them to prefer it to other employments. Let us then consider the various appliances, direct and indirect, by the use of which we may gradually approximate towards the accomplishment of this desirable end.

In instituting a system of agricultural education, there are five general objects to be regarded:—

First, the moral training of the youth, to cause them to love their occupation:

Second, their physical training, to enable them to endure their labor:

Third, their mechanical practice, to fit them to perform their work:

Fourth, their early practical instruction to qualify them to understand their business:

Fifth, their instruction in collateral science to enable them to improve their practice.

The moral training of the youth, included in the first head, is the most difficult point to be discussed, under the present circumstances of the country, when other employments offer more dazzling temptations, and promise greater rewards than the sober occupations of agriculture. Population has not yet become so dense as to cause a man who owns a farm to congratulate himself that it is not other property. Indeed he often feels chagrined, when he considers that the accidental possession of a farm has imposed upon him some necessity to live on it. In too many instances a farmer with five or six sons is unable to induce one of them to remain upon the homestead and follow his occupation. All, one by one, as they approach manhood, leave the farm and give their attention to other pursuits. One learns a mechanical art, another studies a learned profession, and others become tradesmen. Not one can be persuaded to take the farm, though it be promised to him as his inheritance, if he will but consent to occupy it.

We will admit that it is not desirable that every farmer's son should follow the business of his father. All other employments must be replenished by those who go out from the agricultural ranks, which must always furnish the largest proportion of healthy men. The aim of the statesman should be to place agriculture on such a basis, as that the father who is a farmer should always be represented by one

of his sons, and that of several, the one who receives the farm as his portion, should be regarded as the most fortunate, though the others inherit the same amount of wealth; that the farm should not go a-begging for an occupant among the heirs; but should pass down from father to son, with all those advantages that attend the holding of an estate a long time in the possession of one family.

There are many causes for this general aversion to the steady pursuit of agriculture; and in discussing the first point of a farmer's education, it may be well to enumerate some of the most prominent moral causes. The lesson that is taught our young men is not, as it ought to be, to prepare themselves to obtain a good livelihood, and to practice that industry and economy which will slowly, but surely lead to competence: on the contrary, they are taught to look with secret contempt on one who would be satisfied with growing rich by the slow process of industry and frugality. A virtuous economy is not distinguished from avarice and meanness. Young men are led to overrate the importance of superfluous wealth, the hope of which absorbs nearly all their thoughts. The aims of ambition presented to their minds, are to be "great men:"—not industrious, honest and intelligent citizens—but men of excessive wealth or distinguished position—for such only receive the eulogies of the press, the pulpit and the lyceum.

If all the young men, who are destined to be farmers, could be inspired with an ambition that is based upon the pursuit of agriculture, this ambition alone would cause them to become skilful and intelligent in the practice of their art. It is those who love their occupation who are the most likely to become well acquainted with it. The means and opportunities for the acquisition of knowledge are so great, that it is more important to increase the desire for any branch of knowledge than the opportunities for gaining it. But so long as young men commence the business of farming, with an ambition only to be rich, they will not employ their minds upon the best modes of cultivation, but upon the means that might be used to cause a rise in the value of their estate. They will endeavor to get a railroad station near it, or some manufactory, not to improve the market for its products, but that they may convert the old homestead into house-lots, and make money by the sale of them. Without denying that such enterprises may often be advantageous to the public, it is evident that this method of employing the mind is ruinous to the attainment of useful agricultural information or skill, and to the improvement of the farm.

This chance of growing rich by land speculation is very apt to ruin the thrift of a farmer, because it diverts his mind from his business, and employs his faculties in a way that does not increase his proficiency in his art. One is more likely by such efforts of the mind, to become a good politician than a good husbandman. Any train of circumstances, therefore, which serves to discourage these diverting hopes of wealth, and these speculating habits, and turn one's attention to the science and practice of agriculture, as his exclusive occupation, will prepare him for excellence in his department. This must be a slow process, and must partly grow out of the changing condition of

the country; it cannot be wholly the result of any direct system of training or instruction. But many influences may still be brought to bear upon the public mind, which may serve to hasten the development of a general love for rural occupations, and an ambition among farmers to be excellent in their business.

So long as our young men engage in farming against their free will and inclination, because they are crowded out of other paths; so long as, while occupied in the field, they comfort themselves with the hope that something may happen, which will turn the old homestead into a field for land speculation; so long as their ambition finds no gratification in the management of the farm, we would say, though they may be useful and intelligent citizens, they cannot be skilful or successful farmers. Some of the right ambition might be fostered by efforts that should induce men to improve the beauty of their farms. Many a youth might be prompted to retain the farm in his possession by that love which was first created for it, by its picturesque appearances, and those charms that please the eye of a man of taste. Let the old farmers understand, that if they would induce one or more of their sons to follow their occupation, they would find it expedient to avoid marring the beauty of their fields by the destruction of their natural ornaments. The removal of an old oak tree from a knoll in an adjoining pasture, or a fine clump of native shrubbery from the brow of a hill that overlooks the house, may turn the mind of the only one of the sons who has any inclination for farming, into another direction. Who can tell how many good resolutions, in favor of rural pursuits, have been destroyed by the axe that laid low the beautiful ash tree that shaded the path to the old farm-house, or the noble oak that showered its sweet acorns in some familiar nook! The avarice of the farmer who sells to the "timberer" the sylvan beauty of his estate, has made many an intelligent youth a voluntary exile from his paternal fields.

To make the farm an object of affection, it must also contribute something to gratify the desires of the ambition. A man who is proud of his farm would also wish to be proud of his farming. A taste for rural embellishment, prudently and economically directed; for that kind of embellishment which appeals to the principle of utility and to the love of nature rather than of art, may be made an important aid in improving the education of farmers. As soon as one begins to improve the appearance of his estate, he begins to improve his taste and his knowledge; and though he should spoil some things in his attempts, he becomes a gainer by the exercise which the work has afforded his mind.

It is somewhat dangerous to recommend home embellishments, as they are generally associated only with architectural follies, with nice gravel walks and showy parterres. The generality of men find it difficult to understand the meaning of embellishment, as applied to those simple and rustic ornaments that cost nothing, and which are so peculiarly appropriate to a farmer's home. The books which have been published in England and in this country, on "Landscape Gardening," furnish no valuable ideas to the New England Farmer, and the best of them would serve but to lead him astray.

There are many other congenial influences that might be used to inspire young men with a love for rural pursuits. They are now too apt to consider their hard hands as disgraceful, and to overlook the honors which may be held in them. No man would be ashamed of his hard hands, who could point to certain results that prove them to have been intelligently employed. Let him show by his good practical information, his gentlemanly deportment, his excellent farm, his beautiful estate, and his happy and virtuous family—a subject as worthy the pride of an American as of a Roman—that his hard hands are associated with a superior intellect, and are proof that his mental gifts are not conjoined with physical degeneracy. Let him be proud of his possessions, not as mere evidences of wealth, but as proofs of industry, skill, intelligence and taste. How noble is such an ambition, compared with the wretched vanity of those, who sacrifice their manhood, and submit to the abject slavery of fashion, to gain a little short-lived notoriety.

Some beneficial effects might be produced by furnishing the town libraries with books that serve to raise the merits of rural pursuits. Books that aim, by the statement of agreeable facts, not by mere declamatory praises, to exalt our ideas of a farmer's life, and to render it pleasing both to the ambition and the imagination of youth, should be selected for the juvenile libraries. If no such works exist, they ought to be written. This is one of the neglected departments of literature ; for the praises which Virgil and Horace bestowed upon a country life, are in the present age considered as mere poetical fictions. The counting-room, not the open field, is now lauded as the situation most becoming a freeman. The slavery of confinement is preferred to the wearisomeness of labor, and men who were formerly taught to venerate the plough have forgotten their ancient faith, and have turned to a new worship.

We must not omit to speak of the improvement of household economy, as likely to cherish a love for farming occupations. We introduce this subject in connection with what we have said on moral training, because the comforts and luxuries of home within the house, must exert an important influence in making one contented with his employments in the field. The table, no less than the fireside, should furnish a rational entertainment to the family, to fill the minds of the different members with agreeable anticipations, when they are away from home, and with cheerful satisfaction, when they arrive. If young men were accustomed to associate the farmer's life with all the wholesome luxuries of an ample and generous board, they would hold it in higher esteem, as well as affection. But if it is associated with the idea of a mean, unwholesome and monotonous fare, such as we see upon many farmers' tables, it is hated and despised. Our farmers' wives know less of the art of preparing culinary fruits and vegetables, in a variety of ways, than the people who live in town. Strange as it may seem, they understand the confectioner's art better than they know how to prepare for the table the simple products of the farm! A farmer's fare is exceedingly monotonous, and is far from being a model in regard to wholesomeness or economy. A little tract giving an account of all important vegetables and annual fruits, which may

be raised for domestic use, the method of cultivating them, and the art of preparing them for the table, ought to be published and circulated among farmers.

We will conclude our remarks under the first general head, by alluding to the establishment of frequent periodical fairs, in order to supply the want of social pleasures, consequent upon the isolated character of a farmer's home. This want of society is a sad misfortune, in many cases, and contributes, perhaps as much as any other circumstance, towards creating a dislike for the occupations of agriculture. It is a want, however, which will gradually be supplied by the increase of population, and the multiplied facilities of travelling; but it may also be relieved by many expedients, which would indirectly aid the cause of education. Such would be the influence of monthly agricultural fairs in the several counties or districts.

We will now turn our attention to *the physical training which is necessary to enable the young men to endure their labor.* A boy who is to be a farmer, and who is expected to work with his own hands, must from his earliest years be trained to robust exercises. He must be educated in such a manner, as not to be incapacitated to endure the toil and hardship of a farmer's life. Without this hardihood his business would be a sore affliction, and not an agreeable and healthful employment. Labor and practice must attend all his steps; and a knowledge of the application of science to agriculture must be imparted to him during those days and hours, when occasion requires a suspension of labor. All the gifts of science which a young man can thus obtain, without a relinquishment of those habits of invigorating exercise, which are needful to insure a capacity for toil, are clear gain to agriculture. For every art, the youth who is to be instructed in it, must be trained in harness; and the knowledge that comes to him while handling the implements of his art, is worth more than the same amount gathered in a library. A slavish continuance of labor ought to be condemned, because every man has a right to the enjoyment of life; but there is always danger, lest during long and frequent relaxations from labor, a young man may lose, both his capacity to endure and his willingness to follow a toilsome occupation. Such an objection is very generally urged by our farmers against agricultural colleges, which they say, would not only unfit the youth for labor, but would cause them to turn away into other paths.

But our people obtain their ideas of an agricultural college from the customs of our literary institutions, in which there is no just provision for the physical training of the pupils. In an agricultural school, this would form a very important part of the exercises; and at such an institution, under a good system of regulations and discipline, as at a military school, the boys would be hardened by their labor on the farm connected with the school, while they were pursuing a course of studies. But agricultural colleges must be slow in coming into existence, and under the most favorable auspices, could not extend their benefits very widely among our scattered farming population. Without denying the advantages which would accrue to those who should receive their education at such a school, we must at pres-

ent consider how we can make the best use of the means of education which are available.

We must not overlook the fact that the farmer, unless he be possessed of great wealth, must be a working-man. He is not obliged to be a drudge; he may consistently with his robust frame and his laborious habits, be a man of extensive knowledge and an intelligent citizen; but he cannot be a student, in the usual acceptation of the term; nor a searcher of libraries. Like a soldier, he must be trained to robust exercises; he must be able to endure severe occasional toil, and must be preserved from physical degeneracy. Men of sedentary habits may be powerful in sudden efforts of strength; but the laborious alone can endure long continued exertion.

Excellence in any calling, or profession, cannot be attained without the entire devotion to it of all one's faculties. If we wish to convert our farmers into an aristocracy of landlords, a body of country squires, who shall merely superintend the operations of the farm, the physical training required by a laboring farmer, might in their case, be omitted. But they must not only enjoy increased advantages of education, they must also increase their wealth, by making it at least ten-fold greater than it is at present. It would be nothing to such a body of farmers, whether they could hold a plough or swing a scythe; nothing to them that they could not perform half a day's labor, nor bear exposure to cold and storm. Such a class of men, however, does not exist in the New England States. Our farmers in general are men who have but little wealth, except their houses and lands; and the amount of labor they can afford to hire is very inconsiderable. Out of these it would not be possible, if it were desired, to create a class of wealthy men of leisure. The aim of the statesman should be to improve the intelligence and practical skill of our present yeomanry, without inducing less industrious or laborious habits. The only cases we should except are of those individuals, who from ignorance and the want of sufficiently liberal ideas, have become voluntary drudges, and wear themselves out with excessive toil.

Superior intelligence, caused by the diffusion of knowledge among the mass of farmers, would probably diminish the necessity for the present amount of labor to produce the same results, since knowledge is confessedly one of the most important means to increase the efficiency of labor. Too many of our farmers are now mere drudges, and their wives and daughters are the same. This is the fact, in many instances, in which poverty cannot be pleaded as an excuse for it, and when it is plainly the result of ignorance, meanness or stupidity. It is a misfortune to be doomed to such excessive and unremitting toil, as to be disqualified for any exercise of the intellect, or for social recreations. This is the misfortune of some of the peasantry of Europe; but our people ought to be ashamed of it, because it is not their doom. Slavish toil is disgraceful to freemen, and produces both physical and mental degeneracy, by wearing out the body, and causing the faculties of the mind to pine away from disuse. We should endeavor to raise this class of our farmers from their present voluntary servitude, by extending to them the means of education. After they have become intelligent men, they will be thrifty farmers,

without degrading themselves to the condition of beasts of burden. Acknowledging the dignity of labor, when it is guided by intellect, we should endeavor to convert our farmers into a superior class of working-men.

The Americans are probably excelled by Europeans in the capacity to endure severe labor and hardship. This is not the effect of our climate, but of the changeful and unsystematic habits of our rural population, with respect to labor and exposure to the vicissitudes of the weather. Few of our farmers have always been steady in one pursuit. Farmers' boys are generally vacillating between shoemaking and farming, during all their early years, and sometimes for the greater part of their life. They frequently pursue the two occupations together, being shoemakers in the winter, and farmers at other seasons. Such a course may have been promotive of their interest, under the past circumstances of the country. But the sedentary and confined habits of the shoemaker are enfeebling, and a shoemaking farmer, other things being equal, cannot be so robust and so capable of enduring protracted labor and exposure, as one who has always confined himself to the exercises of the farm. One may be somewhat more intelligent on general subjects, if he has joined his occupation with other pursuits; but his practical skill in agriculture must be somewhat diminished by the same causes. We cannot have an agricultural population equal in practical skill and efficiency to that of the best agricultural provinces of Europe, until a change of circumstances has caused our farmers to be exclusively devoted to their art. So long as farm-labor is so unsystematic, that during a considerable part of the year, a farmer must attend to other business to fill his unoccupied time, agriculture cannot be carried to perfection.

While treating of the capacity for enduring labor and hardship, as an indispensable qualification for a working farmer, the question naturally arises, how far an individual may cultivate his mind without enervating his body. This is an important physiological inquiry; for it is granted that the highest cultivation should be recommended to every class of working-men which is compatible with the requisite amount of muscle and physical energy. But there is a law of compensation, which it is unwise either to ignore or to overlook, how much soever it may disturb our ideas and hopes of human perfectibility. While it will not be denied that the best system of education, for any class of people, is that which permits none of the physical, moral or intellectual powers to remain unimproved, it must be admitted — however deeply we may regret that nature has established such a law — that any amount of time or exertion which is devoted to an intellectual pursuit, is subtracted from the time and exertion which might be employed in hardening the muscles, and fortifying the health. While we are cultivating our faculties for a certain class of exercises, we are sacrificing so much of our opportunity, not to say our ability, to acquire skill in exercises of an opposite character. Hence the notorious fact, that the most thrifty men, in the common ranks of life, are those who are fitted only for one occupation, if that one is their own special calling. A want of versatility is favorable to success, in the case of all who have learned and adopted a profitable business. Those

who are ignorant of all arts except their own, have no temptation to turn aside from it. They do not yearn for a more agreeable and congenial exercise of their faculties, like one of superior talents who would see many other ways in which he might be more pleasantly, if not more profitably employed.

We will not pursue this analysis any further, but hasten to the conclusion, that a different system of physical, moral and intellectual training is needful, respectively, for the members of the different trades and professions. If we train a merchant to be a philosopher, though we may increase his usefulness to society, we spoil his chance of becoming rich. If we inoculate a mechanic with a knowledge of the law, he becomes more skilful in disputation than in the use of tools. If we convert a farmer into a book-worm, his conversation is likely to be superior to his practice, and his head becomes stronger than his hands. The educational question, which has not yet received a satisfactory answer, relates to the course of training and instruction which will serve in the best manner to improve the rural classes in knowledge, and give them, at the same time, the greatest efficiency as agricultural producers. It seems to be very generally admitted, however, that they should learn by practical observation and occasional reading, rather than by any regular devotion to the study of books.

We are not prepared to contend for that severe application to toil that leaves no time for recreation, or for the acquisition of knowledge; but merely for that regular devotion to robust exercises which is necessary to preserve the greatest vigor of the physical constitution. Our rural population must be preserved from physical degeneracy, or as a nation we are lost; for it is on this class that we are to depend for the constant re-inforcement of the other ranks of society. We can place no such dependence on the great body of artisans and mechanics, since the majority of the mechanical arts tend, more or less injuriously, to cramp one set of muscles and to overtask another set. It is not among mechanics or the learned professions, that we are to look for the most complete amount of physical development. Many of the mechanical occupations are of such a sedentary character, and so partial in their exercise of the frame, as to deform the body and seriously impair the constitutional vigor. This cannot be said of the employments of the farm. The sons of farmers, if brought up to agricultural labor, are, above the children of all other classes, likely to become good models of sound physical men. Their employments exercise about equally all parts of their body: there is not a limb or a muscle that is not continually brought into action. If our farmers, at the present time, do not exhibit such a completeness of development, it is because in connection with farming, they have pursued other occupations which are less healthful, or they have committed certain essential errors of diet and regimen, which are very common among our laboring classes.

When employed, therefore, in devising a system of agricultural education, we must not overlook the necessity of preserving the rural classes from physical degeneracy. It is better that they should be less scientific than less robust, less studious than less healthful: better that they should be good farmers by rote, than effeminate scholars

who are unable to work. It is not probable that any action of our agricultural societies can revolutionise the habits of our rural population; but without doubt a succession of wisely directed efforts might set in motion a reformatory action, that would gradually elevate this class to the point which should be the end and aim of a rational philanthropist.

In studying these effects, we must not forget the influence of opinions which, in their action on the general mind, when first introduced, are like alterative medicines to the human system. If we can but succeed in infusing correct opinions into the minds of men, these ideas will cause them to do for themselves what a wise ruler might wish to do for them, by the establishment of good institutions. The rural classes have been greatly prejudiced against the improvement of their minds, by hearing too much said in favor of scientific attainments for the farmer. Their common-sense inclines them to believe that there is more cant than philosophy in all this preaching. If we claim too much for science, in its application to agriculture, our audience may refuse to allow so much as they would, if our claims were less exorbitant. They perceive a certain incompatibility between study and labor, between hard muscles and a full mind; and hence they are led to doubt the advantageous application of science to the exercise of their art. A contrary opinion must not be enforced upon them without qualifications; for the common-sense of uninformed men is often right when philosophy is wrong.

Men must be taught in a way in which they are willing to receive instruction, and will not learn from those whose teaching humiliates them. A farmer is usually proud of his common-sense, of his bodily strength, his sagacity, his manual skill and his practical information. Though he may over-estimate himself, he cannot too highly estimate these qualities, of which any man may reasonably be proud. If we approach one of these practical, sagacious and sturdy fellows, and humble him by trying to prove that he would be a better farmer, if he was likewise a man of science—a chemist, a botanist, an entomologist and philosopher—he is offended. He has a sort of intuitive understanding that such a combination of science, practical skill and robust vigor is impossible. The man who is trying to enforce upon him the value of science may state many undeniable truths, but he cannot convince him that a college would turn out so many good farmers, among the same number of pupils, as an agricultural district, with the farm for the school-room, nature for the laboratory, and intelligent farmers for instructors.

The third division of our subject relates to *the early mechanical practice which is required to fit young men to perform their work.* The distinction between *practical knowledge*, and *manual skill* or *mechanical tact*, is not generally understood, but it is a very important one. The proprietor of a farm, who should superintend its operations, if he were young and capable, though he never joined in the labor, would soon obtain a practical knowledge of farming. But unless he participated in the labor, he would not learn to hold a plough, to swing a scythe, nor to perform any but the most simple operations of agriculture. He might be thorough in his practical

knowledge, a good adviser in regard to times and seasons, sowing, reaping and all that appertains to successful practice. Still he is not a complete farmer, because he is wanting in manual skill and mechanical tact. He cannot with his own hands perform the *manipulations* of the farm.

An ignorant journeyman, on the other hand, who feels no particular interest in farming, except to perform satisfactorily those manual operations which are required of him as a hired laborer, such as ploughing, sowing, mowing and reaping, may be very deficient in practical knowledge, and incapable of managing a farm. The qualifications of each of these men must be joined in one to make a complete farmer. The first is a man of practical knowledge without mechanical tact, the other possesses mechanical tact without practical knowledge. Too many men who call themselves farmers are mere users of tools, efficient workmen under the direction of others, but wanting in that fund of intelligent experience which a master farmer must possess. In large manufactories, where there is necessarily a minute division of labor, it may be expedient to convert men into machines, each individual performing only his particular part of the work. But the farmer must be a whole man, not a machine; he needs to be both head and hand: he must have strength united with skill, skill with experience, and experience with intellect. Otherwise he is but the fraction of a farmer, and must depend on others, either for guidance or execution.

With regard to manual skill and practical knowledge, we would remark that there are more who would acquire the first than the last, under equal opportunities for becoming proficient in each, because an aptness to perform mechanical operations is a more common talent than an aptness for nice and intelligent observation. But it cannot be said that one is more important than the other. It is the practice of these manual operations that gives a man that complete physical development which is essential to a working farmer. One may learn how land should be ploughed, by looking on, while the ploughmen are at work; but if he only looks on, he loses two advantages: he fails to acquire that hardness and vigor of muscle which are developed by such exercise, and the mechanical skill and tact which are needful for performing the task. The same may be said of all the other exercises of the farm.

The farm must be the gymnasium in which strength and dexterity are acquired, and the school in which the agricultural art must be taught. Manual skill, like skill in debate, in mathematics, or in any exercise of the wits, can be acquired only by early practice. Science must be learned in college; music in the concert room, the art of war in the camp, and the practice of agriculture in the field. While an intelligent lad is working on a well-conducted farm, he learns more than we might at first believe: he is at the same time obtaining knowledge, hardihood and dexterity. If he is building wall, every stone he lifts from the ground hardens and perfects the growth of his muscles, and every stone he places upon the wall accustoms him to the skilful adjustment of the different materials. While he is ploughing, he is acquainting himself with the character of different soils; and

when engaged in weeding, though he is not a botanist, he learns to identify all the various plants that inhabit the soil. The fund of practical information thus obtained by capable men is not fully appreciated, nor is the public generally aware how many different uses of the muscles are required by the common tasks of the farmer.

A physician or a merchant may resort to farming, and without the advantage of early practice, be remarkably successful in his new business; and the success of such individuals has led many persons to overrate science when compared with practical experience. But it will be found that these men are always dependent on the advice of some person who has, from his youth, been accustomed to farm-labor, and has become practically conversant with its exercises. Were they left alone in their undertaking, or were they assisted only by others like themselves, they would make a sad failure. He who attempts, after his youth is past, without any previous experience, to carry on a farm, soon discovers, that notwithstanding his superiority to the mass of farmers in his capacity to learn new things, and in the power of judicious discrimination between the value of new and old systems, he suffers a painful inferiority, in minute practical knowledge, to the most ordinary laboring man who was bred upon a farm. Men who leave the ranks of a profession, or a counting-room, to become farmers, and who, on account of their more liberal ideas, obtain many important advantages over the old practitioners, do not always sufficiently consider how poorly their education would serve them, if there were no practical farmer to advise them, nor skilful workman to perform their labor.

Some may be disposed to deny that the manipulations of the farm require that long apprenticeship which is usually devoted to learning a mechanical art. This may be true of any particular branch of farm-work; but there is a great variety of labor and skill involved in the whole circle of operations. A young man who is strong and capable, may learn in one season to swing a scythe, so as to be reckoned competent to receive ordinary wages; but an experienced mower would readily perceive his own superiority. If, however, he could perfect himself in one set of manipulations during the first season, he would require a second season to learn another set, and before he was proficient in all departments of skill, he would have served nearly a seven-years' apprenticeship.

It is worthy of remark, that while men in general see very clearly that they cannot be good practitioners of certain arts, without a long course of study and experience, they believe that there are other arts which they would not be obliged to learn, but may, if they please, "take up," at any time. One of the occupations which they suppose they can "take up" thus suddenly and without preparation, is farming. When they watch an artist who is drawing the working-plan of a house, in all its parts, they perceive, if they are not artists, that he is performing a work which is beyond their own ability; but when they see a man dropping potatoes into a hill, or hoeing up weeds, they think they see the evidence that any one can be a farmer. The practice of agriculture and the practice of medicine resemble one another in this indistinctness of their requirements; yet they are the

most difficult of all arts, because there are so many circumstances in their experience, which cannot be precisely stated or exactly defined. Hence there are multitudes of stupid and ignorant persons, who believe they can successfully act the farmer or the physician, because they are incapable of seeing or appreciating their deficiencies. With respect to mathematics, and all the exact sciences and arts, every man of common-sense, who is ignorant of them, understands the proof of his ignorance. A man sees at once why he cannot make a telescope, or survey a coast by trigonometry; but he cannot see why, if he has learned the virtues of a few herbs, and the names of a few diseases, he may not be a physician, or why, if he knows how to put seed into the ground and cover it up, he may not be a farmer. A science or art requires experience, in exact proportion to the uncertainty that exists in the application of its rules and principles; yet this very uncertainty renders the ignorant more bold in assuming the practice of such an art. Hence the multitude of quacks who invade the ranks of medicine and of agriculture.

A complete farmer will be found, therefore, only among those who were brought up to the business of farming. All others must be awkward in the performance of their labor, unskilful in their manipulations, imperfect in their practical knowledge, and if they carry on a farm, can be successful only by using the advice and experience of their hired men. The operations of ploughing and scattering seed, of mowing, reaping, gathering and stacking the different crops; the rearing of animals and the management of cattle, both when employed in labor and when in the stall; the modes of executing the different tasks connected with their training, and the adjustment of their harness and their burdens; the care of fences and buildings and the preparation and equipment of agricultural implements, constitute a variety of performances, and require a manifold exercise of mechanical skill, which can be acquired only by many years of early practice.

To encourage this kind of practical skill and dexterity, it is evident that we must promote the growth of a class which is exclusively agricultural. We do not say *caste*, because this would imply a certain want of freedom to leave its ranks; and such a state of things is always fatal to improvement. All farmers' sons in this country are not expected to be farmers; it is sufficient that those who consent to be their representatives, should be trained from their early years with this expectation. The others are expected to constitute the best materials to replenish the ranks of other occupations. Our people have but little idea of the extreme nicety with which many of the operations of the farm are conducted by the rural classes of Europe, and which is the result of their exclusive attention to their art. This carefulness has never yet become a matter of absolute necessity in our system of agriculture; but the efficiency of labor depends greatly upon it, and it will become ere long indispensable to the farmer's thrift and success.

The next topic of our discourse on the education of farmers is *the early practical instruction they require to enable them to understand their business.* With regard to practical knowledge and manual skill

in executing the tasks of labor, it would be very far from the truth to say that one might not be an excellent farmer with these two qualifications alone. Indeed, it would be difficult to find a person who joined these qualifications with a proficiency in agricultural science, which is more generally possessed by those who may be called amateur farmers. Every man is not able to learn science in the midst of his necessary avocations, and there are not many who are born with the capacity to understand general principles. The majority of men, even when highly educated, must be governed by facts and dogmas. The mass of practitioners in the learned professions and the liberal arts, though possessed of deep learning, are mere matter-of-fact men and followers of routine, because every man is not born a philosopher. It is a good and efficient practice, therefore, which is needful to be inculcated upon the majority of every profession and calling. If we can but soften the prejudices and obduracy of farmers, that they may be willing to renounce their errors, to admit new facts and adopt new ways, we shall have attained the most important advantage for the furtherance of our ends.

We have chiefly confined our remarks to incidental means of instruction, but have not yet devised any systematic course of education in the agricultural art. If we ask farmers how a young man could be most properly instructed in this art, the answer which would be given, almost unanimously, would be—"Put him on a farm with a capable farmer, who will set him at work, and he will learn his business by practice and observation, joined with such instruction as he may receive from his master." Nothing could be more reasonable than such advice, under the best circumstances of agricultural practice, and it corresponds with all the precepts we have inculcated in this essay. The boy, if he equals his master in good habits and capacity, would probably become just such a farmer as his master; but if he obtained instruction from no other source, except his master's precept and example, he would not be likely to surpass him.

We are led, therefore, to inquire how the lad is to obtain that additional instruction which, under the present imperfect condition of American agriculture, the generality of farmers could not impart either by precept or example? It is admitted that the best school for agriculture is the farm, that the best teacher must be a farmer, and that practice is more important than study; but it does not follow from this admission, that every farm is a good school, nor that every farmer is a good teacher. It remains, therefore, to discover some means which may be successfully used to convert the generality of farms into good schools and to supply the farmers' deficiencies in the capacity of teachers. Shall something be annexed to each farm, or to each agricultural district to furnish that instruction which the present generation of farmers cannot impart; — shall agricultural schools be established to supply this want; or, lastly, shall it be supplied by the distribution of books and tracts, the diffusion of agricultural journals and the multiplication of lectures?

Let us first consider what sort of appendages might be made to the farm, or annexed to an agricultural district to answer these purposes

of education. The adjuncts recommended by different writers and lecturers on the intellectual wants of agriculture, are reading-rooms, cabinets and libraries, and courses of lectures on the different departments of farming. With these are to be associated farmers' clubs, to meet at the reading-rooms, for the purposes of debating, conversation and study. To render them useful in the highest degree, the public would be invited to send curiosities and other useful and interesting matters to the cabinets, and individuals of other professions would be invited to participate in their discussions.

Each of these schemes would, as far as they are practicable, secure some of the purposes intended. But there are many obstacles that interfere with the general establishment of them. Associations of farmers cannot be instituted or maintained, like mechanics' associations, because the rural classes are scattered widely apart, while mechanics are congregated in towns and villages and can readily assemble. Farmers' clubs and associations, except in some highly favored districts, must assume the character of fairs, which may be held periodically for the exhibition, sale and purchase of agricultural products and live-stock. We have no doubt of the great benefits that would result from the establishment of clubs, reading-rooms, cabinets and lectures; but they cannot be extended or multiplied so as to meet the wants of the whole population. They must, even if they were numerous and general, be widely distant from the majority of those who would be expected to attend them. Nothing could be got up at these rooms and at these meetings, of sufficient interest to call tired laborers together, from their distant and isolated homes; and a very small number only would feel any lively concern in the object of such institutions. This last remark would not apply to periodical fairs, because the pecuniary interest of the parties would induce them to attend. Of these, their connection with the prosperity of agriculture, and their influence on the education of farmers, more will be said in another essay.

Theoretical attainments, and the knowledge of practical details may be said to exert in one respect an opposite influence on the mind of a pupil in agriculture. The first, carried beyond certain limits, would tend to divorce a young man from his business, and wed him to other pursuits more tempting to the ambition. Study not only disinclines, but partially incapacitates one to endure protracted or severe labor; and a speculative habit of mind is a bar to steady progress. But the greater one's proficiency in practice, the more closely is he bound to his pursuit; for, just in proportion as one feels conscious of his ability to excel others in the occupation to which he was bred, would be the strength of his motives to adhere to it. A man's ambition commonly lies in the path of his talents and acquisitions, and he will not forsake this path as long as it affords him a good livelihood. In regard to practical knowledge, therefore, the remark of Pope is strictly true—that "a little learning is a dangerous thing," because one's practical deficiencies would be fatal to his success. But in regard to theoretical knowledge, so far as it concerns the farmer, the maxim might be reversed; a little learning is useful, but more might destroy his inclination for the labor of a farm.

It seems less difficult, however, to devise methods of communicating scientific than practical knowledge to the youth, beside that which they would learn on the farm. All those who are willing to read might learn the most important results of science from books and lectures; but practical details are not so easily communicated through such mediums, and must be acquired chiefly by observation, experience, and verbal instruction while pursuing one's avocations. The theory only of any art can be thoroughly taught in books. A young man of good talents may learn from books the whole theory of banking and mercantile business; but if, without having been bred to the arts of banking and trade, he should attempt to practice them, he would find himself greatly inferior to many an ordinary person who was incapable of comprehending a general principle. Many an able writer on the economy of trade would make a miserable financier.

Still it will not be denied that a very considerable amount of practical information may be communicated by books and lectures. Our agricultural journals have been an important medium for the conveyance of practical knowledge as well as science. A book may exhibit the best methods of performing the different operations of grafting and budding, of transplanting, of draining, of constructing fences and buildings, of identifying and destroying injurious insects, and a variety of other matters which may be explained by words or illustrated by diagram. But there are many other things which cannot be stated with sufficient clearness in language. No man could learn from books to distinguish the different varieties of wood and timber by their grain and general appearance; or the marks by which an excellent animal is distinguished from one nearly as good — marks which are well understood by a farmer who is practically skilled in the physiognomy of domestic animals.

Many a person knows by experience those signs in the heavens that indicate what the weather may be for the two or three following hours; but, however excellent in description, he could not by words, without exemplification from nature, make others understand these signs. He must call them to him and show them the actual appearances; he must give them a portion of his own practical experience. Books cannot intelligibly define all the different marks by which a practical farmer distinguishes a good soil from a poor one, a calcareous from a siliceous soil, or a fresh soil from one that is worn out and exhausted. These marks are seen chiefly in their productions; and to explain them all in words would require long pages of details. But the experienced farmer reads them all at a glance, from the page of nature. On an exhausted soil he sees the starveling weeds coming up almost without foliage; grasses in meagre tufts half enveloped in moss; bindweeds with not strength enough to extend beyond a few inches from their roots; grey mosses, or *jungermannia*, appearing among a few feeble shoots of brambles and lycopodies, and an occasional grasshopper, that seems restless and discontented amidst the insufficient provision of nature for his sustenance. It would be impossible to enumerate the marks of a worn-out soil, none of which a practical farmer ever mistakes; and though he may not be able to give

a botanical name to a single one of these plants, he is no less accurate in his observation and his judgment.

An important step towards improving the rising generation in practical knowledge would be taken, if any way could be devised for teaching farmers in general the art of conveying their own ideas in words. This is not a common faculty: even those who have what is called the "gift of the gab," seldom possess it. With this power of explaining their ideas, less of the knowledge which the masters possess would be lost to their apprentices. This object might be partially accomplished, by writing a practical farmer's own ideas in simple and intelligible language, and presenting them to him in print, for his perusal. By this perusal of his own knowledge it would assume a more palpable form, and a more distinct arrangement in his own head. He would "understand himself" better than he did before. Many persons of ordinary education but good practical sense, might be made capable instructors, by the aid thus afforded them. Independent of this advantage, a practical farmer would feel complimented by seeing his own thoughts clothed in expressive terms, and made clear to his understanding. There is many a farmer who can write the English language grammatically and with propriety, who would find himself greatly at a loss for expressions, to convey his thoughts distinctly to another's mind. Words are important aids to thought, and improve the clearness of our comprehension, as diagrams assist the pupil in geometry.

This course of reasoning would seem to indicate the advantage of publishing and distributing among farmers, short tracts on subjects of practical agriculture, after the system pursued by religious tract societies. These should not be thrust intrusively and unceremoniously upon the heads of families, but sent to them by their leave and under the general title of "Tracts on subjects connected with practical farming in New England, gathered from the experience of farmers, for the benefit of their youth." As means of instruction, these tracts would be more effective than the agricultural journals, we may say, without any disparagement of the latter. When one takes up a tract, if he reads it at all, he would read something that appertains to agriculture: whereas if he takes up a newspaper, the agricultural paragraphs might be the only parts which he would omit; and they are usually the parts to which the young reader pays the least attention. Besides, if the tract were published by a committee of an agricultural society, it would seldom put forth any important errors; while the editor of a newspaper, however correct in his knowledge and judgment, is constrained to publish many crudities and whimsical notions to satisfy the vanity of his correspondents.

It is needless to enumerate the topics which might be discussed in a series of agricultural tracts. It is enough to say that they should be written in a simple and luminous style, that they should treat only of those matters which can be made interesting, and that they should be gratuitously distributed. When treating of science they should not be abstruse; it is better to leave some important things unsaid, if they be so abstruse as to disincline the reader to continue to the end

of the chapter. The tracts on scientific subjects ought, therefore, to be written by intelligent persons, who are not professors of science, as the latter are notoriously incapable of rendering their ideas in popular language. Those of a practical description might be written by any one who has the command of an easy and perspicuous style, and who is sufficiently acquainted with agriculture, to make correct reports of the information he should obtain from its original sources.

An editor, who is capable of writing a part of the series, should be appointed to superintend the preparation and publication of the tracts, which might be distributed according to the following plan:—Let each County Agricultural Society in Massachusetts receive at the cost of paper and printing, as many copies as they might see fit to circulate among their fellow-citizens. The Massachusetts State Board of Agriculture might be responsible to the printer and publisher, and pay the editor's salary, as their part of the expense and trouble of the enterprise. The burden of distribution, and the publishers' cost of all they distribute, might fall upon the County Societies, as their part of the labor and expense. The tracts should be published monthly, in small duodecimo form, printed with long primer type, and containing about eight or ten pages. The cost of the publication would be too small to stand in the way of its expediency.

In the last division of our subject, we are to treat of *the scientific instruction which is needful to farmers to enable them to improve their practice.* A good and efficient practice must not be sacrificed, nor even jeopardised by application to the elements of scientific farming. Let the youth be thoroughly versed in all the branches of practical agriculture: it is sufficient, if they are only inoculated with science: the mind is cleared thereby of those vulgar humors called prejudices, which are the grand obstacles to progress and improvement. It is not desirable to convert farmers into men of science: their avocations will not permit them to acquire the learning of a professor: but they ought, as far as possible, to be made familiar with those important results of the investigations of learned men, which bear closely upon the interests of agriculture. Some of the discipline of science would also be valuable to them, by giving them an intelligent ear and a willingness to listen.

He may be considered therefore, a good scientific farmer, who is acquainted with the general results of science which are important to agriculture, though he may be ignorant of the processes that led to them. If, for example, one has learned the constituent properties of a good soil, though he may not be able to analyze it; if he knows why a plant is dependent on its foliage for its growth and development, though he cannot state the methods by which this fact may be proved; in fine, if one understands the general results of agricultural chemistry, though he is no chemist; 'the improvements in agricultural machinery, though he is no mechanician,—he has all the science which is generally available to the farmer. More than this cannot be expected of those who devote the greater part of their time to labor, and who must acquire a large stock of information from experience, before they can establish themselves in business.

The most unwilling learners are those who are proficient in a certain mode of practice, and who possess but little general knowledge. They perceive their own expertness in an art which but few understand as well as they do, and they have naturally become proud of their proficiency and jealous of those who attempt to instruct them. This sort of bigotry is the result of ignorance, but not the ignorance of one's business, and it is very common among good practical farmers. A little more general knowledge would give them a willingness to learn new ways, and to correct their errors. It is the obduracy of such men that causes them to jog along in the old by-road of professional routine, while the public is carried forward in the car of innovation. Hence we may account for the fact sometimes observed, that young men who leave the ranks of some other business and become farmers, go ahead of the old practitioners, in spite of their want of skill and practical knowledge.

One great desideratum, therefore, in agricultural education, is to gain a willing audience among practical farmers, and to show them, without wounding their pride, that there are many things to be learned by which they might improve their practice. A slight acquaintance with the facts of science tends to liberalize their minds in this respect; and as soon as one has been converted into a willing listener, he cannot avoid becoming a learner. The streams of knowledge are pouring down the hills of science in a thousand different channels. They would spontaneously flow into every capable man's mind, if he would consent. But many of our farmers shut them out by positive efforts, lest they should disturb the sluggish waters of prejudice that form a charming landscape to their sight.

The public entertains no very distinct ideas in relation to the amount of science which is required by the farmer for the improvement of his practice. The error of those who have treated of the subject consists in demanding a larger stock of information of this kind, than could by any means be rendered available to the generality of working-men. In regard to chemistry, it may be expedient that a farmer should know the chemical relations and affinities between acids and alkalies, between oxygen and metallic substances, and the results of their different combinations: he should understand the mutual dependence of the soil, of the atmosphere, of animals and of vegetation upon each other, and should know their constituent elements. All this he might learn, without deep study, from a little instruction in the grammar of chemistry, which ought, indeed, to be introduced into the district schools, being important to other arts beside that of the farmer. The grammar of chemistry would enable one to learn and understand many facts which are constantly presented to the observation of farmers, and are lost to them for the want of that rudimentary instruction that would make them intelligible.

Most people feel a sort of contempt for botany, as if it were only an amusement for young women, and not a grave study worthy of a man and a philosopher. They associate the study only with flowers, without considering that it has occupied the whole life of some of the

greatest of men. Our horticulturists generally possess a good knowledge of botany; and though it is not equally important to the farmer, it would greatly assist his progress in knowledge, and afford him many a pleasant exercise of his observation. A farmer should understand the general principles of classification, and should be able to identify a plant by a botanical description. How limited soever this knowledge, every new fact which he learns renders him more intelligent; and every new ray of science that enters his mind, removes some film of bigotry that has been drawn over his mental sight.

Let a young man understand the elements of any branch of science, and his observations will constantly add to his knowledge, while if he were ignorant, his observations might serve only to confirm his prejudices. We are not surprised when we observe how much better a man can work with tools or instruments than without them. But the principles of science are the tools of observation, without which it is blundering and inefficient. Even if instruction of this sort in the public schools were to reach only a few minds, those few would render a vast service to others by enlightening and directing their observation. If there be but one well-educated man in a district of intelligent farmers, the whole number are profited by his knowledge and his wisdom. Every neighbor sharpens his wits on this man's grindstone. They all likewise respect their occupation the more, because they can reckon one superior man in their ranks.

Geology is useful in explaining the resources of the country, and assists one in estimating the value of land in different localities, from the geological character of the place. But the principal advantages of this science are such as arise from its influence on the mind. Geology, above all other studies, engenders habits of reflection, and interests one in the observation of nature; and when we meet with a farmer who is a lover and a student of nature, though we might not warrant that he is a more successful practitioner than others, we are sure that he is satisfied with his occupation. Many young men become reconciled to the confinement of a counting-room in the city, because it brings them in contact with the city's amusements. In like manner, those who are fond of the study of nature will love the exercises of the farm, which is a part of nature's domain.

It ought also to be expected that every practical farmer should understand the habits of the principal insect pests of his fields and orchards. A great amount of useful knowledge of this kind is frequently picked up by ingenious men, who have no acquaintance with the science of entomology. But had these persons been early instructed in the grammar of this science, their observations would have been conducted with method, and with much less effort they would have obtained more valuable knowledge of the habits of insects. As we have already intimated, one important method of instructing young men in the elements of these sciences, is to introduce them into the district schools. Let there be a higher class to receive instruction in the grammar of each of the branches above enumerated.

It is only through the district schools that the generality of the rural population can be reached, during the period of youth, and the

addition of these exercises would but slightly increase the expense of the schools. If a higher grade of qualifications was consequently required of the teachers, those only would be excluded who, under present circumstances, are unqualified for their task. Should lectures be established, according to the suggestion of an able writer* on this subject, they might be connected with recitations at the district schools; and in some cases the teacher might be employed to lecture. Lecturing, however, is so expensive, that it would be difficult to make it sufficiently general, to convey instruction to the great mass of the farming population.

The tract system would seem to be admirably adapted to diffuse information on all scientific subjects. In connection with this it might be advisable to make offers of prizes to a certain number of individuals who should pass the best examination in the several departments of agricultural science and experience. Let ten prizes of equal amount, for example, be offered annually by each County Agricultural Society, to the ten individuals, members of a farmer's family, who will give the fullest, most correct and most intelligent answers to a series of questions to be proposed by the Society. The questions might be published as one of the series of tracts, to be followed, after the examination, by another containing the answers.

It is not probable that there would be a perplexing number of competitors for the prizes; the more, however, the better for the spread of information. Many young people of both sexes would be stimulated by these offers to make some progress in knowledge. Among farmers, as among other classes, there are some whose ignorance proceeds from a want of natural capacity. These must always remain mere drudges; they cannot be observers and thinkers. But the majority are ignorant not from a want of ability, but because their desire for knowledge has never been awakened. Such are the individuals upon whose minds, the offer of prizes of this kind would act in a favorable manner. The few, however, who are stimulated to engage in the studies and contend for the prizes, are not the only ones who would receive the benefit of them. Many a young man who jocosely ridicules his comrade, for collecting flowers and minerals, or chasing bugs, would assist him in his explorations, and become the recipient of important knowledge.

Year after year similar offers might be made — for the best examinations respecting the names, the cultivation, and the comparative value of the different grasses; concerning the relations of chemistry and agriculture, the character of certain soils, rocks, fertilizers and other substances found in the earth; also, on the identity and habits of certain prominent insects which are injurious to the farm and the garden. By such methods young people are assisted in educating themselves; and it is on self-education, stimulated by the efforts of those who are watchful of the public welfare, that the chief reliance must be placed. They are induced to study by the excitement of their curiosity, consequent upon reading the questions proposed in the tract or the newspaper, and accompanying the offer of the prizes. Many

* Hon. George Boutwell.

a happy family-circle, during a leisure evening by the fireside, or while resting from their labors in the day, would employ themselves in asking these questions of each other, and puzzling out the answers.

But we must ever keep in mind, in our attempts to improve the farmer's education, that the main point is his practical proficiency. All other kinds of instruction must have a direct bearing towards this —the polar star of his educational course,—and every aid he receives in his progress must take this direction, filling his mind without diverting it from its destination. All the tracts, therefore, on scientific subjects, must be eminently practical in their bearing; neither abstruse nor hypothetical. They must enlighten without confusing his mind, not perplexing it with notions, but establishing facts, whose relation to agriculture is perfectly clear. In the offer of prizes, the practical department should receive full attention; for any person would become more proficient in his art by acquiring a habit of assigning reasons for his practice.

Prizes of this character would serve also to elevate the business of farming in the opinions of men, by implying an acknowledgement, that intellect is required for the occupation. This is not implied in the award of premiums for agricultural essays; for these are seldom written by farmers; and however expedient the offer, and however useful the essay, the farming community are often chagrined at seeing prizes of this kind carried off by one who, they well know, cannot equal themselves, in the knowledge of practical agriculture. Premiums should, therefore, be awarded, for intellectual exercises, in which farmers and the children of farmers should be the only competitors, and under such circumstances as would prevent the personal diffidence of the candidates from standing in the way of their success.

It may be objected to the offer of prizes for examinations in certain branches of knowledge, that some individuals would obtain the premium, who are excelled in industry by others who could not so readily explain the reasons for what they do, and that it would be better to give prizes only to industry. It may be remarked, however, in answer to this objection, that among qualities which are equally important, we should hold out the most encouragement to those which are the least common. Among our people, insufficient knowledge is more common than indolence; and it is not their industry that requires a spur, which is needful rather to their rational curiosity and intelligent observation. The intellectual habits of our countrymen are greatly injured by their propensity to devote all their attention and observation to the arts of trading and bargaining. Hence, they are "sharp," industrious and active, rather than intelligent. Those virtues and those habits require the most encouragement which do not grow up spontaneously. It should be added that our societies have always encouraged the useful virtue of industry by the award of premiums for fat animals, good crops and well-tilled fields. They should now stimulate industrious men to cultivate habits of intelligent observation, to learn to state the reasons for their practice, and to express their ideas with ease and perspicuity.

All vapid eulogies on the noble character of the farmer's occupation amount to nothing; they are but so many idle words that do not serve

in the least to increase its respectability. This end can be attained only by elevating the rural classes as intelligent beings. A farmer's business is no reproach to him in this country; no man, whatever may be his social position, is unwilling, if he be the son of a farmer, to make known his pedigree. But the time has not yet arrived, when it is regarded as a positive honor to be a farmer; and it will not arrive, until the farmers rise above the present standard of education. Agriculture, as all will admit, is a noble art; but the practice of it can be honorable only to those who are thoroughly acquainted with it, and who are intelligent citizens as well as successful farmers.

TRANSACTIONS

OF THE

MASSACHUSETTS SOCIETY

FOR

PROMOTING AGRICULTURE.

NEW SERIES,

Vol. 1:

PART II.

BOSTON:
1859.
J. H. EASTBURN'S PRESS.

TRANSACTIONS

OF THE

MASSACHUSETTS SOCIETY

FOR

PROMOTING AGRICULTURE.

NEW SERIES.

Vol. 1:

PART II.

BOSTON:
1859.
J. H. EASTBURN'S PRESS.

OFFICERS AND TRUSTEES

FOR THE YEAR

1859.

PRESIDENT:

GEORGE W. LYMAN.

FIRST VICE-PRESIDENT:

CHARLES G. LORING.

SECOND VICE-PRESIDENT:

THOMAS MOTLEY, Jr.

TREASURER:

DAVID SEARS, Jr.

CORRESPONDING SECRETARY:

JAMES W. PAIGE.

RECORDING SECRETARY:

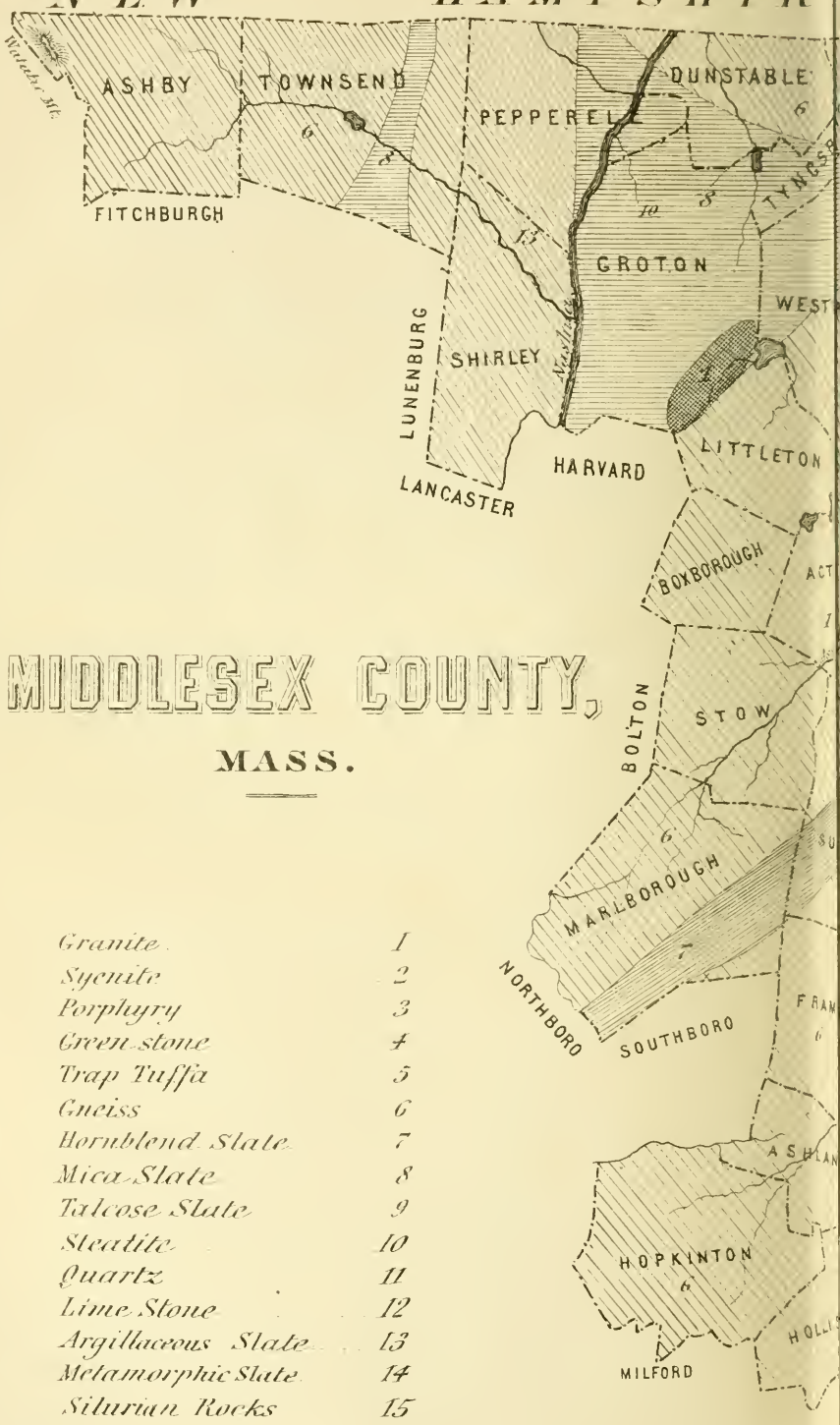
RICHARD S. FAY.

TRUSTEES:

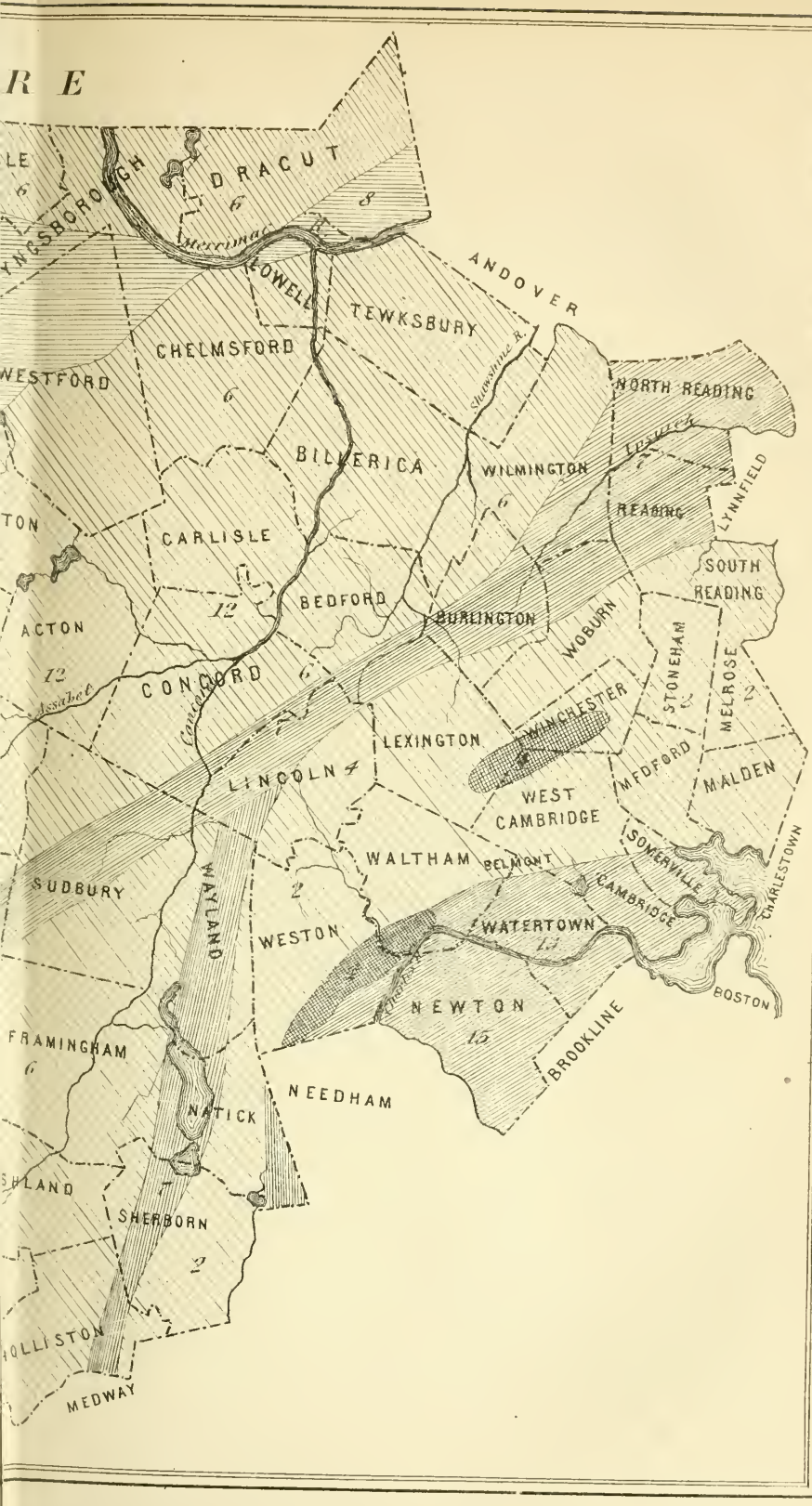
ROBERT C. WINTHROP,
GEORGE PEABODY,
STEPHEN SALISBURY,
WILLIAM S. LINCOLN,
GEORGE T. BIGELOW,
GEORGE B. LORING.

TABLE OF CONTENTS.

☞ A Third Part will be printed, to complete the Volume, when an Index will be prepared.



Granite	*1*
Syenite	*2*
Porphyry	*3*
Green-stone	*4*
Trap Tuffa	*5*
Gneiss	*6*
Hornblend Slate	*7*
Mica-Slate	*8*
Talcose Slate	*9*
Steatite	*10*
Quartz	*11*
Lime Stone	*12*
Argillaceous Slate	*13*
Metamorphic Slate	*14*
Silurian Rocks	*15*


R E
DRACUT
Merrimac R.
LOWELL
TEWKSBURY
ANDOVER
CHELMSFORD
WESTFORD
Shawsine R.
NORTH READING
Lesuer
BILLERICA
WILMINGTON
READING
LYNNFIELD
CARLISLE
SOUTH READING
BEDFORD
BURLINGTON
WOBURN
ACTON
STONEHAM
MELROSE
CONCORD
Assabet
Concord
WINCHESTER
LEXINGTON
MEDFORD
MALDEN
LINCOLN
WEST CAMBRIDGE
SOMERVILLE
WALTHAM
BELMONT
CHARLESTOWN
SUDBURY
CAMBRIDGE
WAYLAND
WATERTOWN
WESTON
Charles
NEWTON
BOSTON
BROOKLINE
FRAMINGHAM
NEEDHAM
NATICK
SHERBORN
MEDWAY

TRANSACTIONS.

Agricultural Survey of Middlesex County.

By Joseph Reynolds, M. D.

1859.

Geography of the County.

Population in 1855, 194,032.

Area, 544¼ square miles.

Population to the square mile, 356.

Middlesex contains 348,314 acres of land, about 230,000 of which are improved. It is divided into 52 towns. It is 37 miles from Holliston on the south, to Dunstable on the north, and 42 miles from east to west, Malden being the most easterly, and Ashby the most westerly town. Middlesex is bounded on the north by New Hampshire, on the east by Essex County, on the south by Norfolk, and on the west by Worcester. Its outlines are very irregular, except on its northern boundary.

The surface of the land is considerably broken and hilly; but there is only one elevation in the county entitled to the name of a mountain. This is Mount Watatic, which is partly in Ashby, and partly in Ashburnham in the county of Worcester. The height of this mountain is 2300 feet. There are several hills in the county, from 400 to 800 feet in height.

Nearly the whole surface of the county has a northeasterly inclination. A chain of hills enters it from Harvard, in Worcester County, and running northeasterly, through Shirley, Groton, and Dunstable, divides the waters of the Nashua River from those of the Concord. Another chain enters it from Upton, in Worcester, and passing through the southerly part of Hopkinton, divides the head-waters of the Concord from the affluents of the Blackstone. Still another range, in

Milford, Holliston, and Sherburne, divides the waters of the Concord from those of the Charles. A range of highlands through the northerly part of Lincoln, Bedford, and Billerica, separates the Concord from the Shawshine River.

The general direction of the rivers and streams is indicated by the inclination of the surface. The whole county, with the exception of the southeast corner, may be considered a part of the valley of the Merrimac. This river flows through the northeast corner of the county. It enters the town of Tyngsborough, from New Hampshire, and passing through that town and the city of Lowell, divides Tewksbury from Dracut, and passes into Essex County, and thence to the ocean at Newburyport.

As we go west from the Merrimac, along the northerly line of the county, we enter the valley of the Nashua. This is a considerable river, and flows through a beautiful section of country. One branch of it rises in New Hampshire, and another in Worcester County. It enters Middlesex from Lancaster, in Worcester. It divides the easterly part of Shirley from Groton; then crossing the western part of Groton, it becomes, for a space, the dividing line between Groton and Pepperell; then entering Pepperell, for a mile or two, it divides that town from Dunstable. It empties into the Merrimac at Nashua, N. H. Its course, after it enters Middlesex, is north by east. It is a rapid stream, and furnishes abundant water-power throughout its whole course, which is improved in Fitchburg, Lancaster, Shirley, Groton, Pepperell, and especially in Nashua, where it furnishes the principal motive power for the large manufacturing establishments of that flourishing city. The soil in the valley of the Nashua is, in general, good. The hills which form this valley, especially on the western side, are many of them broken and abrupt. They yield excellent pasturage. The lower levels, bordering on the river, furnish fertile mowing lands. There is but little intervale land on the Nashua after it enters the county, and no wet meadows. The first affluent of the Nashua from the west, is the Nissitisset, a short stream, which rises in Poponipos Pond, in Brookline, N. H. This stream enters Pepperell on its northern line, and passing

through the town in a southeasterly direction, reaches the Nashua just above the point where it becomes the boundary between Pepperell and Dunstable. This river is about 10 miles in length, and affords good water-power at several points in its course. A few miles to the southwest we find the Squannacook, which is the most important affluent of the Nashua. This river rises in the hills in Ashby, and crossing Townsend in an easterly direction, it turns more to the southeast, and pursues a winding course between the northerly part of Shirley and Groton, and enters the Nashua nearly at right angles, about two miles northwest of Groton Junction. East of the Nashua is Salmon Brook, which rises in Whitney's Pond, in Groton, and passing through Massapoag Pond, runs a northerly course through the town of Dunstable, and reaches the Nashua before its entrance into the Merrimac. The valley of the Nashua includes, in the county, the towns of Dunstable, Groton, Shirley, Pepperell, Townsend, and Ashby; and contains some of the best lands in the county. Some of the farms on the slaty soils of Groton, Pepperell, and Townsend, are under high cultivation, and yield abundant crops.

Leaving the valley of the Nashua, and passing to the southeast, towards the centre of the county, we find Stony Brook, which takes its rise in Spectacle Pond, in the north part of Littleton, and passes through the Forge Village, in Westford, furnishing a valuable water-power to the iron works at that place; then through the westerly and northerly part of Chelmsford, where it empties into the Merrimac.

Proceeding southerly, we next come to the Assabet, which enters the county from Northboro, and traversing the western part of Marlboro, crosses the town of Stow, and enters the town of Concord. Pursuing a winding course, it enters the Sudbury River at the north of Lee's Hill, in Concord. The united waters assume the name of the Concord River, from this point. In its course, the Assabet receives several small streams—the most important of which are Nashoba Brook, which rises in Magog Pond, in Littleton, and passing through Acton, empties into the Assabet near Warner's Pail Factory, in Concord; and Spencer's Brook, which enters it below Barrett's Mill, in

Concord. The Assabet is a rapid stream, and affords several good mill sites. There are some good meadows on its borders.

Indian Brook and Cold Spring Brook both rise in Hopkinton, in the southwest corner of the county, and running a northeasterly course unite in Ashland, and form the Sudbury River. This passes through Framingham, into Wayland. In the northerly part of Framingham, at Saxonville, it receives an additional supply of water from Lake Cochituate. This supply has been estimated to be equal to one-third of the water of the Sudbury River. Some years since a dam was erected across this outlet of the lake for the purpose of turning all its water to the aqueduct leading to Boston, for the supply of the city. This dam has never entirely answered its purpose; a considerable quantity of water has continued to run into the Sudbury River. For some distance this river is the dividing line between Sudbury and Wayland. Then, for a space, it divides Lincoln from Concord. After it passes Fairhaven Hill, in Concord, it bears a little more to the north, and winds its sluggish way through the centre of that town until it receives the waters of the Assabet; when, turning to the east, it soon becomes the dividing line between Concord and Bedford. From Bedford, it passes into and through Billerica, and from thence into Lowell, where its waters unite with those of the Merrimac. This river passes through the centre of the county, from its southwest to its northeast corner, and is emphatically the Middlesex River, being wholly, from its source to its mouth, within the county. In the middle part of its course, it is a very sluggish stream, there being in the space of twenty miles, from Wayland to the Rapids at Billerica, but about twenty-five inches of descent. From Framingham to Wayland there is a pretty rapid current; and from Billerica to the Merrimac, more than fifty feet fall. Upon its borders lie immense tracts of meadow lands, most of which are now of comparatively little value; but which, by proper drainage, might be made as valuable for farming purposes as any lands in the State. Indeed, in former times, they were considered quite as valuable as the uplands adjoining them. They yielded a large burden of grasses of good quality, and were kept in a state of abundant fertility by the deposit from the

annual overflow in the Spring. The hay from them was in great demand, in the towns in the neighborhood of Boston, for the keeping of cows. It is stated, as a historical fact, that the good quality of the hay in these meadows was one principal reason for the early settlement of Concord and Billerica, which were the first towns settled away from tide water.

The meadows extend into Billerica, becoming gradually narrower. At North Billerica, the stream is compressed by rocky shores, and passes over a rocky bed, on which are lying many boulders. At this place the stream is considerably more rapid than at any point above. This is called the Falls. In 1708, the Commoners of Billerica granted permission to erect a dam at this point, for the purpose of working a grist-mill, for the accommodation of the people in the vicinity. This dam did not much obstruct the river above; for the land continued hard, and the hay good, for many years after it was built. At a subsequent period, this dam and mill came into the hands of the Middlesex Canal Company, which rebuilt the dam, raising it somewhat higher, for the purpose of making the river a feeder of the Middlesex Canal. Additions have been made to the height of the dam from time to time, until it has been raised some three feet higher than it was originally. Immediately after the dam was raised to its present height, the meadows began rapidly to depreciate. The canal has been discontinued several years; but a manufacturing establishment now exists at the dam, which is kept up at its full height, and the water, which passed off through the canal, is retained in the mill-pond. In addition to this, reservoirs have been erected on the affluents of the stream, from which water is let down in the dry season, so that the soil of these meadows is kept drenched with water through the whole year. It was ascertained in 1828, by actual survey, that there were but twenty-four inches fall in twenty miles of the river above North Billerica. The consequence is that these meadows, formerly so valuable, have become little better than a mill-pond for the use of the manufacturing establishment. The character of the grasses has entirely changed, and the soil is no longer capable, in its present condition, of bearing good hay. The ground has

become wet and miry, and it is impossible to drive teams upon hundreds of acres which were formerly firm land. Could this obstruction be removed from the river, there is no doubt that in a few years these lands would be restored to their former condition. From eight to ten thousand acres would be increased from forty to fifty dollars per acre above their present value, and their damp surface, which now bears only coarse, sour grasses, and exhales fogs and miasms that generate consumption and rheumatism, would be covered with abundant crops of good hay and grain, and no longer be a source of suffering and death. Could the channel of the river, at the lower end of the plain, where the Rapids in Billerica commence, be cut down three feet, for one or two miles, a work which is easily practicable, thousands of acres would be readily drained, and would be brought under the plough. The manufacturers, who now use this water-power, might carry on their works by steam, and thus relieve the thousands who are now suffering in property and health. Whenever this nuisance shall be abated, these reclaimed lands will add greatly to the agricultural capacities of this section of the county.

The Shawshine River rises in Lincoln and Lexington, and passes through Bedford, Burlington, the eastern part of Billerica and Tewksbury, and empties into the Merrimac in Andover.

The Ipswich River rises in Burlington and Wilmington, and, passing for a space between Reading and North Reading, crosses North Reading into Middleton in Essex. Thence through Topsfield and Rowley into Ipswich Bay, at Ipswich. This is also a sluggish stream, the country through which it passes being the most level part of the county. The land upon its borders is of the same general character as that on the Concord. Towards the mouth of the Ipswich, the tide sets up, several miles, giving to the meadows the character of a salt marsh. Many hundred acres of meadow, in Wilmington and North Reading, have been converted into what is little better than a mill-pond, by a dam thrown across this sluggish stream in North Reading; and land enough for a dozen good farms has been destroyed, in order that one man may get a living by a small mill.

The Mystic River rises in Woburn, and pursues a southerly course through Winchester; and, dividing West Cambridge from Medford, empties into the sea between Charlestown and Malden.

We next come to the Charles River, which will close our account of the rivers of the county. This river rises in Norfolk County, and pursues a very tortuous course. Running to the northwest, it separates Newton from Needham; then, turning to the north, it divides Newton from Weston; thence, inclining more to the east, it passes between Brighton and Watertown and Brighton and Cambridge, and empties into Massachusetts Bay, between Charlestown and Boston. The tide passes up the Charles, about seven miles, and has converted the lower portion of it into a bay. The country upon its banks, in Newton, Watertown, Brighton, Cambridge, and Brookline, is highly cultivated, and adorned by beautiful farms, country-seats, and villas; and is, both by nature and art, one of the most beautiful sections of country to be found in the United States.

Geology of the County.

In considering the agricultural capacities of any district, its Geology is an important element. The knowledge revealed by its study is no less essential to a full understanding of the subject, than the facts made known by the thermometer and the raingauge. The composition of the stones of hills determines, to a considerable degree at least, the composition of the soils which lie at their base, and in the basins and valleys between them. The stones are constantly acted upon by the atmosphere, the water, the heat, and the cold. The particles which are separated from them by these agencies are removed by the winds, and by running water, into the lower levels; and there combining with the remains of animal and vegetable organizations, constitute the soils of these levels.

We must not only become acquainted with the superficial strata, but our investigations must reach at least to the depth to which the surface-water penetrates; for the waters of springs,

which are but accumulations of surface-water, dissolve and bring out the constituents of the stones, and thus affect the soils of the valleys, no less than the waters which run down the inclined surfaces.

But my remarks upon the Geology of Middlesex will be brief, for two reasons: First, because the limits which I have allotted to myself allow me but little space to devote to it; and, secondly, because the geology of the county is not strongly marked by any peculiar characteristics. Indeed, the only peculiar feature of the Geology of Middlesex, is the absence of any marked feature.

By far the largest portion of the county is underlaid by gneis. This stone contains the same simple elements as the granite. Indeed, in many sections, the distinction between the two varieties of stone is not clearly marked—the stratification of the gneis being imperfect, and not readily observed without careful examination. The soils formed by the decomposition of gneis contain the same elements as those formed by the decomposition of granite.

There is scarcely any town in the county which does not furnish gneis, or some form of granite, in ledges or boulders, in sufficient quantities for material for walls, underpinning, and posts, for all necessary uses. In the northern part of the county, especially in Tyngsborough and Chelmsford, granite of a beautiful variety is found in abundance, and has been exported for many years, to a considerable extent. This granite contains mica, and is of a beautiful color, nearly or quite free from stains of iron, and bears well the action of the weather. The quarrying of stone, in almost every part of the county, is a source of considerable revenue.

The greenstone, in Lincoln, Weston, Waltham, and Newton, is a valuable material for building purposes, and is more easily worked than granite. In Waltham and Lincoln it rises to more than four hundred feet above the ocean level, and extends, in irregular ridges, some ten miles. Since the quarrying of stone has been carried on so extensively in Quincy, in Norfolk County, and at Cape Ann, in Essex, the quarrying of stone in Middlesex, except for local use, has much diminished. From

Quincy and Cape Ann the stone is conveyed to market by water, which renders the cost of it much less than when it is transported to any considerable distance by land.

There are many limited beds of limestone in the county, mostly in the valleys of the Assabet and Concord Rivers. The most abundant deposits are found in Boxboro, Littleton, Acton, Concord, Lincoln, Chelmsford, and Carlisle. These limestone deposits are found imbedded in gneis. In Stoneham, in the eastern part of the county, limestone is found in sienite. At many of these deposits, the limestone was formerly worked by the inhabitants; but the scarcity of fuel now renders it more costly than lime from a foreign source. Several of these deposits are capable of yielding lime of good quality; and it is by no means certain that it cannot even now be prepared by means of peat used as fuel, at a price that will render it profitable to the manufacturer, and place it within reach of the farmer, as a fertilizer. This lime is chiefly of the granular variety, and highly crystalline. Occasionally there are found in it, garnets, scapolites, sapphire, and varieties of spinelle.

Limestone is probably in all cases, of organic origin, or at least has entered into the composition of organic bodies. Coral reefs of immense extent, the work of minute insects, are found in various parts of the earth. Calcareous deposits are more abundant the higher we rise, in the strata of which the crust of the earth is formed. Crystallized carbonate of lime may be produced by the precipitation of its particles from aqueous solution, or by the melting of uncrystallized masses of lime under pressure. When limestone is found in regular strata, it is reasonable to refer its origin to solution and crystallization. When it is found in an unstratified and irregular condition, it may be accounted for by supposing that lime deposited from water, or the decomposition of animals, as chalk, marl, compact limestone, and corals, may have been melted, and subsequently deposited in the crystalline form. Calcareous soils are among the most fertile, and if it be true that calcareous matter is increasing on the surface, either by the deposit from animals, or by the transfer from the inferior to the superior strata, by heat, or by springs, it indicates that the soil is increasing in the

elements of fertility, and is a new proof of the beneficence of the Creator.

The soils in this county are probably more deficient in lime than in any other element. From the constitution and arrangement of our rocks, I infer that the supply of lime was never very abundant. Lime is rapidly exhausted from the soil by cultivation, when the products are removed. Especially is this true under a course of cultivation like that which is pursued among us—in which milk, grain, and fruits, are the principal products. Hence we find the application of lime in any form, productive of good results. Carbonate of lime, sulphate of lime, and phosphate of lime in the form of ground bones, produce a marked increase of crops ; and a free use of these is needed to restore the fertility of our worn-out lands. Deep ploughing, which brings up the lime in the subsoil, is doing something to restore it to the surface; but our pasture-lands are suffering from the loss of lime within reach of the roots of the grasses, and persevering and systematic means are needed to restore them to fertility. Ploughing,—and dressing with lime in some form, of which phosphates are doubtless the best,—and re-seeding are probably the most effectual means, where ploughing can be performed. Where ploughing cannot be resorted to, from the nature of the soil, a free use of lime upon the surface will do much good. It will kill out the sour grasses and lichens, and bring in sweet grasses and clover. There is probably no subject which, at the present time, more strongly demands the attention of our farmers, than the improvement of their pasture-lands. The question is often asked, "How much lime is it beneficial to put upon the soil?" This must depend upon the nature and condition of the soil. Lime is not so much a nutritive element of plants, as a means of rendering other elements in the soil soluble, and bringing them into a condition to be readily taken up by plants and digested. Where there is insoluble humus present in the soil, the lime combines with it, and renders it soluble. Hence, where a soil abounds in humus, the effects of lime are at once visible. When this is not present, its place must be supplied by carbonaceous manures. The more humus there is in a soil, the more lime will it bear.

When land has been too heavily limed, the application of manure, or swamp mud, at once supplies the remedy, and enables the lime to perform its proper office. Lime is especially efficacious in the cultivation of turnips and clover. In the cultivation of almost all kinds of fruit, it is also found an excellent manure. Lime and potash are necessary to the perfection of apples. Hence, a granite or limestone soil is the best soil for apples. In England, where the soils contain marl, or chalk, or lime in some form, in much greater quantity than our soils, five, six, and even eight tons, are frequently applied to the acre. In reclaiming exhausted pasture-lands, from twenty to thirty bushels of bone dust is the quantity usually applied. Lime, in England, is somewhat less expensive than in this country; but my impression is that it will amply repay a free use here, even at the price which it costs us. Peat, or mud and lime, are the materials we are chiefly to rely upon to restore the fertility of our exhausted sandy plains.

In the towns in the valley of the Charles River, graywacke and argillaceous slate-stones are extensively deposited. These stones are most abundant in Natick, the north part of Newton, Cambridge, and Charlestown. A range of mica-slate extends across the county, through the towns of Shirley, Groton, Pepperell, and Townsend. It is also found in Dracut and Lowell. Several varieties of quartz are found combined with the mica-slate. Clay abounds in connection with the slate, in the valley of the Charles, especially in Cambridge, Charlestown, and Medford. This region furnishes the best clays for brick-making, in the county; and their immediate vicinity to the market gives the manufacturer advantage over all other parts of the county. The largest manufactory is in Cambridge, by the side of the Fitchburg Railroad. These works might furnish any amount of draining tiles, at a cost that would enable the farmers, through the whole eastern part of the State, to use them profitably. It is to be hoped that these enterprising manufacturers will turn their attention to the manufacture of this article, that is now so much in demand. There is at present no tile manufactory in the county. The cost of freight from the distant places where they are made, has hitherto limited their use to the more

wealthy cultivators. The want of a manufactory in the county, is every year more deeply felt, as the importance of draining is becoming better understood. The advantages of tile-draining can never be fully developed, until a supply of tiles is brought within the reach of the owners of small estates. Many millions of tiles are wanted for immediate use; for large portions of land in the county, and especially in its central part, on the Concord River, and the brooks that empty into it, cannot be subjected to that deep tillage that will bring to the surface the lime and other elements of fertility contained in the subsoils, until a thorough system of drainage has been established. Beds of clay, of limited extent, are found in various parts of the county, many of which have been worked, at different times. Some bricks are still made, more especially in locations at a distance from railroads. Beds of clay are found in Acton, Concord, Westford, Pepperell, and Lowell—at all of which, bricks have been made. These deposits of clay afford the means of ameliorating the sandy soils in their neighborhoods, of scarcely less value than the swamp muck. Clay has the property of absorbing and retaining moisture, in which these lands are deficient. It also has a strong affinity for ammonia, and when applied in connection with manure from the stable, or any nitrogenous compounds, it has the effect of retaining the ammonia in the soil until it can be taken up by the rootlets of plants. But clay, as a means of improving sandy soils, has not been used to the extent which its importance demands. Should the farmers of the county return to the culture of wheat, as they may with advantage, the use of clay to improve the sandy loams will doubtless be found advantageous, as strong clay loams, well drained, are found to be the best wheat soils.

Steatite, or soapstone, is found in Groton. It has been worked to some extent. But it is said not to be as easy to work as in some localities, owing to the presence of silex.

With a few remarks upon the peat soils which abound in the county, I shall close what I have to say upon the geological formations of the county.

There are extensive swamps and bog-meadows, especially in the central and eastern sections of the county. The most exten-

sive meadows lie upon the Concord and Ipswich Rivers. On these rivers are many thousand acres. These streams are both sluggish, and frequently overflow their banks. Slight obstructions cause their waters to stagnate on the adjacent lands. The alluvium has accumulated, in many places, to a great depth. Large portions of these deposits yield a valuable material for fuel, and as wood is becoming scarce, and its price increasing, the peat is coming more into use, from year to year, for this purpose. These meadows are the true coal-beds of the county; and the opinion is gaining ground, that peat may be found a useful and economical fuel for generating steam and gas. Should this idea ever be found practical, this county will stand even more preëminent, than it now does, as a manufacturing county. But the greatest value of these low lands consists in the fact that they afford an inexhaustible means of restoring the fertility of the worn-out sandy lands in their vicinity. Not only are those deposits that have arrived at the condition of true peat, valuable for this purpose, but the mud which has accumulated in ponds and swamps is no less so. The mud is more readily pulverized, and is rendered fit for use in less time than peat. Whether the deposit is mud or peat, it should be thrown out, at least one year before it is to be used as an ingredient in compost, or to be applied to the soil. The action of the frost pulverizes it more completely than it can be done in any other way. It should be rendered as dry as possible before being used, especially when it is to be mixed with manures. When in this state it is more easily handled, and combines more readily with any substance with which it may be composted. In this state, it absorbs a large quantity of liquid, and is a powerful deodorizer. It is doubtless the best material to combine with night-soil, or with urine. Its use is not merely that of a vehicle, to retain and convey other manures to the soil, but it is itself soon converted into humus, and becomes food for plants. By no other means can this necessary element, in which our soils have become deficient, be so cheaply restored to them. Different deposits of peat and mud differ considerably in quality. A small excess of acid renders them of no value, until it has been removed or neutralized. This may be easily done by the addition of ashes

or lime. It is not now easy to obtain ashes in sufficient quantity, and lime seems to be the only means within reach, to correct the acid condition of the peat. About two hundred pounds of lime to a cord of peat, produces an excellent compound. The acid readily combines with the lime, and the compound affords humus and lime, the elements which are wanting in our long cultivated lands.

Meteorology of the County.

Science is an accurate knowledge of the established laws by which the forces of nature produce their results.

Agriculture, the first and most important of the arts, consists in employing and directing the forces of nature, so as to increase and improve those productions of the earth which contribute to the sustenance and comfort of man. Hence, a knowledge of these forces, and the laws which govern them, is at the foundation of all attempts to improve the art. Among those forces which most obviously and immediately affect the growth of plants, are those embraced under the term Meteorology.

As all plants are made up chiefly of elements previously existing in the atmosphere, its composition and the changes which occur among its elements, cannot fail to be an interesting and important study. The atmosphere is composed of nitrogen, oxygen, water in the form of vapor, carbonic acid, and a minute amount of ammonia and nitric acid. When a plant is exposed to the free action of the atmosphere and the rays of the sun, it is found to increase in size and weight. This increase is owing to the carbon which the plant receives from the atmosphere. Carbon, in the form of carbonic acid, or carbon united with oxygen, is absorbed by the leaves and green coverings of the growing branches, and, in their vessels, is decomposed by the power of the sun's rays. The carbon is appropriated to its own use by the plant, and the oxygen is thrown off into the atmosphere.

The rays of the sun produce at least three distinct effects, or communicate three distinct impulses, viz: the lighting, the heating, and the chemical impulse. It is the latter impulse that

causes the decomposition of the carbonic acid in the vessels of plants. But in order that this impulse may produce its full effect, the heating impulse must be present also; and to render the plant capable of being acted upon, moisture must be contained in the air. By a proper understanding of these facts, we are able to produce an artificial climate, that may enable us to repeat in a northern zone, the growths of the tropics.

The agricultural capacities of a country depend upon its soil and climate. Its climate is affected by several causes,—as its distance from the equator, its distance from the ocean, its elevation above the level of the ocean, the configuration of its surface, and the constitution of its soil—for the soil exerts no inconsiderable influence upon climate. Only a small portion of the heat present in the atmosphere is imparted directly to it by the rays of the sun in their passage through it. It is chiefly radiated heat, or heat received by the surface of the earth from the sun's rays, and reflected to the atmosphere. The amount of heat imparted to the earth depends upon the directness with which the sun's rays fall upon it, and the time during which it falls. The heat reflected from the surface affects more sensibly the lower and denser portion of the atmosphere. Hence, at an elevation of a few thousand feet, the atmosphere is many degrees cooler than at the level of the ocean. It is obvious then that the distance of any country from the equator, and its elevation above the ocean level must greatly affect its climate.

The atmosphere of countries bordering on the ocean is affected by the alternation of land and sea-breezes, caused by the difference in absorption and radiation of heat, by the land and water surfaces. The currents of the ocean, by which the warm waters from the tropics are carried towards the north, and the icy waters from the north rush back to take their place, serve to modify the temperature of the countries near the coast. The currents of the atmosphere arising from the difference of radiation of different portions of the earth's surface, directed to some extent, by the configuration of the lands over which they pass, greatly affect the temperature and amount of moisture of different climates.

Soils differ greatly in their power to absorb and give off the heat which they receive from the sun, as well as in their power to absorb and retain the moisture which falls upon them in the form of rain and dew; and hence the geological structure, as well as the state of cultivation of a soil, affects the climate of a country.

The radiation from a dry sandy soil must be much greater than from a wet soil, or from one covered with herbage; consequently the temperature of the air will be much affected by the nature and condition of the soil.

Our limits compel us to confine our remarks to the temperature and moisture of the atmosphere. Its condition in these respects, produces the most obvious effects upon vegetation.

In order to have a good knowledge of the temperature and hygrometric condition of any climate, we need a series of observations continued through many years; and from these we need to deduce the extremes and mean. Many plants will arrive at perfection only within a limited range of temperature. Others admit a wider range. Hence, it is important to ascertain the temperature of a climate, that we may select the crops best suited to it. If our seasons were longer, or their temperature higher, some of the plants we cultivate would yield their fruit in higher perfection. But we endeavor, and with a good degree of success, to overcome the difficulty by preparing the soil by drainage, for an earlier reception of the seed, and by stimulating the plants to a more rapid growth, by manure. Some plants will not thrive without a certain amount of moisture, the presence of which is revealed by the raingauge. If our summer droughts will arrest the growth of certain crops, it is important that they should be planted as early as possible, and in a deep tilth, that they may get well rooted, and make a large growth before the soil becomes dry. A knowledge of these and similar facts will suggest to the observant cultivator, the proper methods of managing his different crops.

The temperature of Middlesex is considerably affected, especially in its eastern and southern parts, by its proximity to the sea. The extremes are not as great as at points farther inland. It often rains on the seaboard, while snow is falling at a distance

from the coast. The snow does not remain as late in the spring in the eastern as in the western portions. The soil is fit to receive the seed several days sooner in the vicinity of Boston, than at Townsend and Ashby. The cherries, pears, and peaches, open their blossoms from the 9th to the 13th of May, in Cambridge; and from the 13th to the 18th, in the northern part of the county. The nature of the soil, and the methods of cultivation, affect the time of planting more than the difference of temperature affects the season of the blossoming of the trees.

The gardeners in the eastern portion always strive to get vegetables ready for the market at the earliest possible day. They prepare the soil to receive the seed as soon as the frost leaves the ground, by working in large quantities of manure from the stables in Boston. They thus plant a considerable breadth of ground, before the farmers in the upper parts of the county begin to work their lands. By this means they often get two crops of different vegetables from the same ground.

But my space will not permit me to pursue the subject, and I shall present several Tables showing the temperature for the several months during a series of years, made in different places in the county, and in Boston; and others showing the amount of rain.

Mean Temperature of each month in the ten years, from 1848 *to* 1857 *inclusive, according to a Record made at the Merrimac Mills, Lowell.*

Months.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	Average per mo.
Jan.	30.80	28.25	30.10	26.77	22.84	26.83	23.90	28.48	18.32	15.64	25.09
Feb.	30.31	20.75	26.42	30.85	29.46	29.06	25.42	25.14	22.79	31.64	27.38
March,	33.13	37.32	34.18	34.16	36.64	38.06	32.57	36.12	29.51	33.12	33.48
April,	48.03	46.10	43.93	47.16	42.06	28.30	38.86	39.70	51.16	43.03	42.84
May,	55.89	54.58	53.32	55.87	54.71	55.35	58.57	57.51	53.64	56.16	56.18
June,	65.41	72.75	69.03	66.06	70.77	70.75	69.30	75.46	72.03	70.76	70.23
July,	72.74	69.12	73.70	72.03	74.48	69.19	73.86	72.60	64.00	74.27	71.59
Aug.	71.58	71.61	67.03	70.16	68.41	69.37	71.80	74.54	53.80	70.73	68.91
Sept.	58.86	60.10	60.83	63.42	58.83	58.77	*	60.33	61.20	63.00	60.57
Oct.	48.46	50.12	50.48	52.54	50.58	48.70	50.22	*	52.87	52.65	50.37
Nov.	37.56	45.00	42.41	41.51	41.16	39.13	44.53	*	38.73	41.36	41.32
Dec.	36.00	21.51	21.80	22.09	34.88	24.71	25.16	*	23.60	33.70	27.05

* Note. The above Record was made by different persons, from 5 to 7 A. M., at 1, and from 5 to 7 P. M. It will therefore probably vary, somewhat, from Registers kept at the same hour daily.

Mean Temperature of each month for the ten years, from 1837 *to* 1846 *inclusive, and of each year, according to a Register kept by* Rev. Ephraim Abbot, *at Westford.*

Months.	1837.	1838.	1839.	1840.	1841.	1842.	1843.	1844.	1845.	1846.	Average per mo.
Jan.	18.96	29.74	23.18	15.74	28.23	28.13	31.25	18.29	26.61	27.81	24.79
Feb.	24.12	15.52	28.06	30.47	23.84	32.46	19.88	27.96	25.67	21.65	24.96
March,	30.07	30.56	35.24	34.22	33.—	38.20	27.32	35.12	35.97	38.58	33.83
April,	42.64	37.05	41.89	46.73	40.42	48.76	44.10	50.49	43.74	49.65	44.55
May,	50.48	56.81	54.44	55.87	55.43	52.36	55.76	57.14	58.34	55.35	55.10
June,	60.76	65.98	59.44	64.63	66.14	61.11	63.38	63.92	65.38	63.72	63.45
July,	66.33	70.70	69.19	69.60	68.65	71.20	68.82	64.81	69.27	69.03	68.76
Aug.	66.10	64.06	64.94	68.40	68.11	66.89	68.57	65.90	68.92	68.94	67.08
Sept.	55.70	58.79	60.21	60.93	61.66	57.61	63.72	60.14	58.36	65.70	60.28
Oct.	43.76	43.51	49.33	47.82	42.58	41.97	46.93	48.33	51.56	48.19	46.40
Nov.	36.50	38.62	34.43	37.—	36 19	33.32	34.83	39.01	43.23	42.09	37.52
Dec.	25.82	21.52	28.23	25.50	30.24	25.65	29.14	29.39	24.28	27.36	26.91
Mean of year.	43.44	44.41	45.71	46.43	46.21	46.47	46.06	46.71	47.61	48.17	46.13

Mean Temperature of each month, for eight years, from 1851 *to* 1858 *inclusive—of parts of* 1850 *and of* 1859, *according to a Register kept by* Rev. Ephraim Abbot, *Westford.*

Months.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	Average per mo.
Jan.	-	26.21	21.95	27.07	23.54	27.81	17.14	16.41	30.57	24.65	23.81
Feb.	-	30.51	27.—	28.63	24.14	21.28	20.69	32.17	21.39	26.95	25.86
March,	-	36.45	33.45	36.04	32.05	31.98	27.04	31.59	32.26	37.52	33.15
April,	-	45.83	40.70	45.23	42.69	44.31	45.91	40.86	44.95	41.27	43.53
May,	-	55.13	57.34	57.87	57.89	54.33	50.80	54.04	51.86	57.70	54.91
June,	-	63.24	63.97	67.42	65.28	63.77	66.48	62.17	69.13	-	65.28
July,	71.59	70.26	73.45	70.71	73.19	71.33	72.32	70.02	69.15	-	71.55
Aug.	67.92	68.33	66.08	68.60	69.52	66.78	66.34	67.62	64.12	-	66.32
Sept.	60.55	61.85	62.49	62.39	60.20	61.30	62.83	61.51	61.62	-	61.64
Oct.	52.21	53.87	49.73	50.71	49.87	51.79	51.71	50.13	52.15	-	51.35
Nov.	42.51	36.07	37.58	40.78	40.22	41.48	39.59	40.75	34.10	-	39.23
Dec.	26.13	23.11	35.37	30.08	23.99	30.41	20.45	33.63	26.63	-	27.76
Mean of year.	-	47.57	47.42	48.82	46.88	47.21	45.10	46.74	46.49		47.03

Average Mean Temperature for each Month, by three daily observations, during several specified years, and periods of years, as indicated by the Thermometer in the City of Boston.

[From Observations made by R. T. PAINE, Esq.]

YEAR.	Whole Year.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
30 years—1825–54	49.141	27.844	28.275	36.272	46.139	56.586	66.180	71.603	69.262	62.352	51.769	41.110	31.055
10 years—1825–34	49.477	27.314	29.290	37.164	46.878	57.344	66.312	71.524	69.429	62.132	52.281	41.056	31.864
10 years—1835–44	48.325	27.394	26.654	35.153	46.070	56.122	65.795	71.601	69.155	61.861	50.319	38.898	29.521
10 years—1845–54	49.621	28.824	28.880	36.500	45.468	56.291	66.431	71.684	69.203	63.064	52.708	43.377	31.779
1845	50.06	29.00	28.15	37.96	45.46	57.39	68.61	72.83	72.05	61.92	53.95	45.04	26.88
1846	50.28	29.28	23.83	38.87	50.27	56.64	65.14	71.83	71.41	68.14	51.73	45.06	29.66
1847	49.98	29.40	28.99	32.82	44.27	54.82	66.53	73.85	69.49	62.74	51.20	46.28	37.98
1848	49.70	32.37	28.53	35 02	46.99	58.82	65.90	70.11	69.37	60.74	51.60	38.68	37.31
1849	48.93	24.62	22.89	38.22	45.39	53.65	67.57	71.10	69.32	62.17	51.27	47.60	31.67
1850	49.19	30.81	32.88	35.24	43.54	51.84	66.64	70.81	67.55	62.87	53.37	43.94	29.86
1851	49.56	29.94	33.53	39.29	46.64	56 24	64.48	70.78	69.35	62.88	55.20	38.84	26.39
1852	49.19	24.99	30.31	35.23	42.11	56.72	67.27	72.02	66.52	63.09	52.52	40.54	38.23
1853	50.22	30.27	32.52	38.70	46.17	57.17	66.31	70.75	68.95	63.93	52.04	43.66	31.05
1854	49.10	27.56	27.17	33.65	43.84	59.62	65.86	72.76	68.02	62.16	54.20	44.13	28.76
1855	49.55	32.63	24.24	35.57	45.25	54.70	65.52	72.32	67.83	62.95	53.90	43.13	34.66
1856	47.63	21.54	24.50	29.84	46.74	53.33	67.20	73.03	67.79	64.15	53.10	41.96	27.82
1857	48.93	19.28	36.11	34.90	43.43	54.61	63.51	70.94	69.18	62.75	51.66	43.97	36.11

Amount of Rain, at Cambridge Observatory, for each month, from 1848 *to* 1857, *inclusive.*

Months.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.
Jan.	2.51	2.88	3.85	1.02	2.22	3.87	1.86	7.25	5.31	7.86
Feb.	2.41	4.00	2.50	4.21	0.61	5.70	3.97	3.74	0.57	3.79
March,	3.81	2.55	3.26	2.01	2.10	3.30	2.94	1.15	0.97	3.49
April,	2.03	2.25	4.78	9.16	7.94	3.69	4.84	3.99	3.43	8.94
May,	1.93	2.75	7.22	4.14	2.29	6.45	5.45	1.50	6.73	5.16
June,	5.49	1.36	2.97	1.61	4.02	0.55	3.58	3.56	2.86	1.71
July,	2.52	1.06	2.62	3.21	1.86	3.02	3.23	4.84	4.24	6.32
Aug.	5.21	6.51	7.63	1.20	7.50	8.58	0.35	2.27	14.98	6.06
Sept.	6.53	2.02	9.82	3.98	2.00	5.94	4.36	1.21	4.66	2.93
Oct.	1.44	7.56	3.56	4.67	2.91	3.48	2.10	5.51	3.23	3.68
Nov.	4.94	6.43	3.39	4.95	3.82	4.91	7.98	5.32	2.89	2.56
Dec.	4.37	2.78	3.34	1.99	3.17	4.29	4.46	7.19	3.89	4.82
Am't for each year.	43.19	44.13	56.13	38.66	40.50	53.83	45.12	47.59	53.76	57.92

Amount of Rain, at the Merrimac Mills, Lowell, for each month, from 1848 *to* 1857, *inclusive.*

Months.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	Average per mo.
Jan.	2.83	1.13	3.32	2.07	1.44	1.52	2.36	7.81	2.83	3.86	2.41
Feb.	2.10	0.83	4.38	4.43	2.96	6.06	3.53	4.48	1.07	1.63	3.14
March,	3.54	5.07	2.75	1.76	3.06	2.05	3.34	1.12	0.90	2.58	2.61
April,	1.61	2.06	4.22	7.88	8.86	3.45	4.68	5.04	3.48	8.02	4.93
May,	7.41	4.04	7.12	3.29	1.22	5.40	4.31	1.07	5.31	3.58	4.27
June,	4.01	1.70	2.23	2.00	3.33	0.60	3.49	3.81	2.09	3.16	2.64
July,	2.16	2.20	2.78	4.26	2.31	2.36	2.12	3.99	1.73	5.67	2.95
Aug.	3.15	5.53	7.65	3.29	8.07	8.37	0.18	2.32	12.31	5.68	5.65
Sept.	4.06	2.51	6.21	2.86	1.64	4.32	4.67	0.63	4.79	2.29	3.39
Oct.	5.00	7.34	2.61	6.51	2.14	4.30	4.28	5.78	2.03	5.52	4.70
Nov.	2.68	5.70	2.92	5.30	4.78	3.79	6.28	3.90	2.53	2.26	4.01
Dec.	3.75	3.80	4.90	2.03	2.97	1.70	2.84	4.94	3.42	5.13	3.54
Am't for each year.	42.29	41.91	51.09	45.68	42.78	43.92	42.08	44.89	42.49	49.38	

Average amount of Rain for 10 years, 44.65.

The quantity of Rain falling in each month, as registered at the Cambridge Observatory.

Mean of Observations for twelve years.

Jan.	Feb.	March	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
2.39	3.19	3.47	3.64	3.74	3.13	2.57	5.47	4.27	3.73	4.57	4.31

The average amount of Rain for each of the twelve years is 44 inches and 48 hundredths.

Changes that have taken place in the Husbandry of the County.

Middlesex County includes within its limits, many of the earliest settled towns in the State. While the inhabitants were few in number, it was important, as well as convenient, that their settlements should be near each other. Boston was the first, and for a long time the only market in the State, and the only port of entry and export. The roads and facilities for intercourse were few, and it was an important consideration with the early settlers to be as near to the capital as possible. Hence, although the lands on the Connecticut River and in some other sections of the State were superior in fertility, yet the lands in the eastern sections of the State were generally occupied at an earlier period. The raising of grain and stock, and the making of butter and cheese, were the principal occupations of the farmers. The raising of apples was introduced at an early period. The manufacturing of cider, rather than the sale of fruit, was looked to as the source of profit. The apples were generally of an inferior quality, and were little valued as food. Sheep were early adopted as a part of the farm stock, and most farmers kept a few to supply their domestic wants. This was the general course of husbandry, with but little variation, until forty or fifty years ago. Agriculture was little affected by tariffs or foreign relations, until manufactures were established, and the commercial relations of the country had become widely extended. Within the period above referred to, Boston has grown with unexampled rapidity, until it has now become one of the great commercial depots of the world, and its commerce has extended its ramifications to every part of the globe. Its population has spread itself beyond its original limits, until, in consequence of the facilities afforded by railroads, the towns in the immediate vicinity have become so many suburbs of the city. Boston is encompassed on two sides by the lands of Middlesex, and the county has undergone its full share of the changes that have been thus wrought. Fields that were once covered by grain and grass, or herds of cattle and flocks of

sheep, are now cut up into streets and house lots, and covered by villages, dwelling-houses, stores and workshops. In the towns of Malden, Reading, Stoneham, Medford, Woburn, Lexington, Cambridge, Watertown, Waltham, Newton, and Brighton, these changes are perhaps the most marked; but the same changes, to a more limited extent, have occurred in other towns more remote. A large portion of the inhabitants in these towns transact business in the city, and their interests are identified with it. The lands in these towns have become too valuable for the more general purposes of Agriculture, and hence are devoted to certain specific objects.

Within the time referred to, Lowell, in the northeast part of the county, has grown to be the largest manufacturing city in the Union. Lawrence has sprung up just beyond the limits of the county, and various manufacturing establishments have come into existence in other parts of the county, each increasing the value of the lands in its vicinity, and creating a demand for milk, vegetables and fruit, for daily consumption. The same change is taking place in the neighborhood of Lowell, on a limited scale, that has taken place in the vicinity of Boston. Tewksbury, Chelmsford, Dracut, and Methuen, are becoming suburbs of Lowell. The great business of the cultivators of the soil, in the towns referred to, is to supply the increasing demand for milk and vegetable food to the inhabitants within their own borders, and to the markets in the large cities. Nearly every town in the county has daily intercourse, by means of railroads, with one or both of these cities, and the farmers find it for their interest to devote their lands to the business of supplying their daily markets. The Fitchburg and Worcester Railroads, with their branches, enable the farmers, in the northwestern and western towns of the county, to send daily their surplus milk to Boston, and to compete on equal terms, with fruit-growers in other parts of the State. Hence the causes are obvious which have led to great and radical changes in the Agriculture of the county. Instead of relying upon their stock for the means of fertilizing their ground, in the immediate vicinity of the cities and manufacturing establishments, the farmers transport manure from the city stables, and waste from the factories, and work

them into compost, and make them the means of increasing the fertility of the soil. Foreign and artificial manures, and composts of different kinds, prepared in the open air and in barn cellars, now add greatly to the means of the farmers and horticulturists, and have greatly increased the productiveness of many parts of the county, and they enable the cultivators to pursue branches of culture that would not otherwise be attempted.

The use of oxen in the cultivation of the soil has greatly diminished, and that of horses has been substituted in their place. In former years, farmers purchased a large number of oxen in the fall, and kept them through the winter, on their poorer hay, and the next spring, sent them into the country to pasture, and fattened them for the market: Now, this practice is almost wholly discontinued, and cows are kept in sufficient numbers to consume all the hay of the farm. From 1840 to 1850, the number of oxen in the county diminished 28,000. Formerly it was the practice of many farmers to sell a large part of their English hay, but now it is found better farming to consume it all on the farm.

At one time there were at least 25,000 sheep kept in the county. Now there are scarcely as many scores. Since sheep culture has been almost wholly discontinued, many of the pastures in the interior have much deteriorated in value, and it is now a subject worthy of serious consideration, whether the farmers should not again resort to sheep husbandry, as a means of restoring the fertility of exhausted pasture lands, especially as sheep more valuable for their mutton than formerly can now be raised. Indeed the raising of mutton, without any reference to the wool, may be made a profitable business. It has been stated, on good authority, that mutton can be raised at a less cost per pound than any other meat.

The making of butter and cheese has greatly diminished, and many of the best farmers now purchase all their butter and cheese. And along with the discontinuance of butter and cheese-making, the number of swine kept in the county has diminished also. From 1840 to 1850, the number of swine in the county diminished 10,000. Comparatively few farmers

now raise more pork than they require for the use of their families. A great amount of pork is now imported into the county.

The culture of grain, with the exception of Indian corn, has greatly lessened.

In 1840	there were	raised	in the	county,	9,501	bushels	of wheat.
" 1850	"	"	"	"	1,095	"	"
" 1840	"	"	"	"	28,539	bushels	of barley.
" 1850	"	"	"	"	7,735	"	"
" 1840	"	"	"	"	61,105	bushels	of rye.
" 1850	"	"	"	"	45,765	"	"
" 1840	"	"	"	"	86,021	bushels	of oats.
" 1850	"	"	"	"	80,031	"	"
" 1840	"	"	"	"	230,371	bushels	of corn.
" 1850	"	"	"	"	269,908	"	"

an increase of 39,487 bushels of corn.

Indian corn was the only grain crop that had increased; and this was doubtless owing to the demand for meal as food for cows. At the present time, there is probably more corn raised in the county than there was in 1850. At the same time, there is probably nearly as much corn imported into the county by the farmers, as is raised on the soil—to say nothing of the vast amount imported for the use of all other classes of the population.

The corn crop, owing to better cultivation, has increased 15 or 20 per cent. in amount, per acre, within ten years. The crops of English grass have increased,—owing to the same cause, as well as to the fact that more acres are cultivated,—from 25 to 50 per cent. in amount. Meadow hay, which was formerly considered of great value as a means of wintering dry stock, is now but little depended upon for keeping milch cows, as it is found that when that is fed to them, they require an additional amount of grain to keep up the milk. This is especially true in the milk-raising towns on the Sudbury and Concord Rivers, where the meadow hay has much depreciated in value, of late years, owing to the flowage of the meadows. Formerly, most of the natural grasses on these meadows were seed-bearing grasses; now they are almost entirely flat, sour grasses.

Turnip culture, which was formerly almost wholly neglected, is now carried on to considerable extent. The flat turnip and the ruta-baga are the kinds chiefly raised. Some carrots, and some beets, are raised. But the turnip is chiefly relied on for feeding cows.

Flax was formerly cultivated to considerable extent; but even a small patch of flax is now rarely seen.

In Burlington, Wilmington, Tewksbury, Billerica, Pepperell, and some other towns, hops were considered a valuable and important crop until within a few years; but at the present time, only a small breadth of ground for this plant is cultivated in the county. The decrease in its cultivation is owing to several causes. Hops require a good deal of manure, but yield nothing which can be consumed by stock, to make a return to the soil. So long as the natural meadows in the hop-raising towns enabled the farmers to keep good stocks of cattle, they were able to keep up the fertility of their lands; but since the quality of the hay on the Concord and Ipswich Rivers has so greatly depreciated, they can no longer rely on this as a source of fertilizing material, and they are compelled to raise such crops as will make some return to the soil, or it soon becomes exhausted. Hop-poles have become scarce and more costly than formerly. Another, and perhaps more important reason, is that the price of hops has been very fluctuating. The price has varied from eight to thirty cents per pound. It is found that the cost of raising hops in this county is about twelve cents. When, therefore, the price is reduced to twelve or thirteen cents, the farmers begin to plough up their vines, and put the land into other crops. The present law of the State, which prohibits the sale of strong beer as an intoxicating drink, serves to diminish the demand for hops, and, of course, to reduce the price. All these causes combined, have reduced the crop to a small amount.

But notwithstanding these and several other changes of minor importance, the Agriculture of the county is in a more productive state than at any former period. This is made obvious by many facts. The dwelling-houses of the farming population are better than formerly, and are kept in better repair. They are generally painted, and many of them furnished with blinds.

They are arranged with regard to the comfort and convenience of the occupants; and there is increased attention paid to the setting out of ornamental trees and shrubbery. Many farm-houses have good kitchen-gardens, containing many of the finer sorts of vegetables and fruits for the table. Barns are very much better than formerly. Nearly all the barns that have been built within the last ten years, are constructed with cellars for manure, and the storage of vehicles. The character, and of course, the value of horses, oxen, and cows, throughout the county, have greatly improved; so that at the present time, no better stock can be found in any part of the State. The carriages and farm implements are of much better quality, and much more numerous. The farmers themselves and their families are much better clothed. Their houses are better supplied with household furniture, and that of better quality. Schools of a higher order are established in all the farming towns, and books, newspapers, periodicals, and the means of information, are now more abundant, and in the hands of every family. The value of real and personal property belonging to the cultivators of the soil, has greatly increased. These and many other facts that might be mentioned, going to show the thrift of the farming population, prove that the Agriculture of the county is in a healthy and progressive state.

Staple Products of the County.

The leading pursuits of the cultivators of the county, at the present time, are the making of milk, and the raising of fruit, potatoes, and market vegetables. The cultivation of grass and Indian corn occupies a large share of the time and attention of the cultivators; but they are cultivated chiefly for the purpose of feeding cows, and may be properly considered under the general head of milk-raising. The culture of other grains, with the exception of oats, receives but little attention; and oats are cultivated more for fodder than for grain.

Milk.

The farmers situated on the lines of railroads leading into Boston, are almost all largely employed in the making of milk. Their object is to produce the largest possible quantity of milk from the cows they keep. Less regard is paid to the quality of the milk, than on the farms where butter and cheese are made. It is therefore an important object to keep only such cows as will yield a large quantity of milk, that the food consumed may yield the largest number of quarts. The next consideration is to keep the cows in such a manner, and to feed them with an abundance of such food as will keep up the milk to the maximum quantity. In butter-making, regard must be had to quality, rather than to quantity; for it is well known that four quarts of the milk of one cow will yield more butter than eight quarts of the milk of another. Should the farmers of the county turn their attention to butter-making, they would probably be compelled to exchange a large portion of the cows which they keep at present, for others which would give richer milk, and to make a corresponding change in their manner of feeding them.

I will consider the business of making milk under the following divisions:

1st. The breeds of cows.

2d. The feeding and management of cows.

3d. Marketing the milk.

I have already remarked that the object of the milk-raiser is to get the greatest possible amount of milk from his cows. I should rather say, to get the greatest possible amount from a given number of cows. It is no object for him to keep a large number of animals, as it is with the beef-raiser. The milk-raiser never says, I have been able to keep so many cows on so many acres, or on so much hay; but, I have made so small a number of cows eat so much hay, or so much grain, or other food. If the milk-raiser can get the same amount of milk from two cows that he formerly got from three, he saves one-third of the outlay for stock, and something in the cost of keeping—for it costs less to keep two cows very well, than three tolerably

well. The first object then, is to get the cows that can be made to yield the largest quantity of milk.

The breed that forms the basis of the milking stock in the county, is the old Red stock, called the Native stock. This breed has been in the country many generations, and has become thoroughly acclimated. It is a hardy, active breed, possessing many good points.

In 1817, Jersey stock was introduced into the State by the Massachusetts Agricultural Society. About the same time, the famous bull, Fillpail, of the Flanders breed, was introduced. These were rapidly followed by stock from the Teeswater, Holderness, Durham, and other families of the Short-horn breed. Other importations of the Alderney or Jersey breed, and more recently, of the Ayrshire, have been made. The blood of these various families has been extensively mingled with that of the Native Red stock, and has greatly improved its character—until a good animal can scarcely now be found which does not present proof of its relation to one or more of them.

The milk-raisers, until very lately, have bred but few of their cows. They have purchased from the drovers and butter-makers to replenish their stock, heifers, in the fall or winter, before they came into milk. The mixed race referred to above, affords them a good stock from which to select. They purchase the best they can find, and depend upon high keeping to make them good cows. Many of them prove good—equal, perhaps, to those of any breed whatever. On the other hand, many of them fail to come up to the standard of good cows, and have to be turned over to the butcher, and often at a loss. Within a few years past, the price of good cows has become much higher than ever before, and the milkmen are finding that they can raise their cows cheaper than they can purchase them, and are beginning to believe that if they would be sure of good cows, they must obtain them from some fixed breed. They find it too uncertain a business to attempt to breed cows from a mixed race. The results are too much like a lottery. This leads them to inquire what are the best breeds for their particular business. The Short-horned family grow to a large size, and with abundant keeping, make noble cattle. They produce a

large amount of beef, and make strong, heavy oxen. Their beef is of somewhat coarser fibre than that of the smaller breeds, and the cows do not yield milk in proportion to their size and the cost of keeping them. When crossed with the old Red stock, they make fine animals; but these cannot be depended on to breed from. The Devons are a smaller breed, very beautiful, of a uniform red color, hardy and spirited, and docile under the yoke. The cows yield milk of a good quality, and do not require so rich food to keep them in high flesh as the Short-horns; but the quantity of their milk cannot be so readily increased by high feeding, as they are disposed rather to take on flesh under such circumstances, than to secrete more milk. The Devons endure our cold winters better than the Short-horns, and are well adapted to the purposes of the beef-raiser, as they arrive at maturity at an early age.

Within a few years past, the Ayrshires have attracted the attention of the milk-raisers. They present, perhaps, more of the points of a good milch cow than any other breed. They are hardy, sprightly, good feeders, and present in their whole figure, as well as in their separate organs, those qualities that are sought in a milch cow. High keeping, while giving milk, does not cause them to lay on flesh so readily as it does the Devons, but increases rather the quantity of their milk; and this fact, I think, more than any other, is the cause of the preference given to them by the milk-raisers. They transmit their peculiar traits to their progeny, with as much certainty as any other breed. The first cross with the old stock produces animals oftentimes equal to the pure bloods for milking, and many think superior for beef. The practice of crossing them will doubtless be continued, especially by those who do not wish to breed from the mixed race. Breeders who would be sure of the good milking properties of the Ayrshires, must rely upon pure blood, or they will be subject to frequent disappointment; for it is a well-known law of breeding that we cannot rely, with any degree of certainty, upon obtaining the peculiar characteristics of any animal until they have been fixed, by being transmitted through several generations. The only serious objection to the Ayrshire cows is the small size of their teats. Their udders are

well formed, round, compact, reaching well forward, never pendulous or fleshy, and the milk-veins are well developed. A cross with the old Red stock generally cures the defect in the size of the teats, but often causes a pendulous or fleshy bag. The Ayrshires fatten readily when dry, and make fine beef. This stock has been known in Scotland about eighty years, and great pains has been taken to keep it pure. The breeders in Ayrshire do not allow their stock to breed until they have arrived at such an age that defects will be developed in the animals if they exist in them. If a bull or heifer reaches the age of about three years without exhibiting defects of constitution, form, or disposition, they allow them to breed. If defects begin to show themselves, the animals are turned to the butcher. In this way they continually improve the breed. Our farmers, on the other hand, permit the heifers to come in at two, or soon after, and put the bulls to cows when they are eighteen months old, and use them beyond their strength, so that by the time they are three years old, they are nearly worthless. I cannot but think that the course pursued by the Ayrshire dairymen is altogether the most judicious. No breeder, who regards the reputation of the stock which he raises, should ever breed from defective or imperfectly developed specimens; and certainly no farmer who raises stock for his own use, should subject himself to the loss that will surely result from such a course. "To breed from the most perfect specimens of the best kind of stock," should be the farmer's motto.

The Jerseys are from the Channel Islands. It is now more than fifty years since this stock was introduced into this country. There have been repeated importations from different families of this breed. The full-blooded Jerseys are small, and rather homely animals. Their milk is very rich. High feeding serves rather to enrich their milk than to make fat on their bodies. It is difficult to keep them in good flesh while they are giving milk freely. They are great eaters, in proportion to their size. They will continue to give milk until they come in again, if well fed. Instances have occurred of heifers giving ten quarts a day when they first calved, and never giving less than six quarts until the day they dropped the next calf. When dried,

they fatten easily, and make very delicate beef. They are well suited to the park, and to families which keep one cow to furnish milk for domestic use. Those who regard the quality of the milk or beef rather than the quantity, will delight in the Jersey stock; but for the general purposes of the farm, or for the milk-raisers, they will never become favorites.

On the whole, I would say, the larger the proportion of Ayrshire blood the milk-raisers can introduce into their stock, the better they will consult their interest. Very many of the farmers in the county have already arrived at the same conclusion, and the more generally they raise their own cows, the more generally will they adopt this opinion. The farmer cannot expect to find, in any one breed, all the properties he might desire. He must be satisfied with the race that unites the greatest number of them.

The use of oxen in this county for farming purposes, as I have already said, has considerably diminished, and the labor of horses is being substituted in its place. But few oxen, comparatively, are now raised; and it will probably be better for those who do not fancy oxen of the Ayrshire breed, to purchase oxen of the Devon, or Durham, or Native breeds, and raise only cows. When farmers shall be convinced that this is their true policy, they will probably be satisfied that the Ayrshires possess, in the greatest degree, those properties which render them the most profitable for that particular branch of husbandry which they are pursuing. Many farmers imagine they may find or make a breed of cattle that shall be the best for all farming purposes, including work, beef, milk, and breeding. The search for such a breed is much like the search for the philosophers' stone. It may lead to many important results, but will never lead to the very thing they are searching for. But I have pursued this branch of my subject as far as my limits will allow.

Keeping of Cows.

Since the farmers of the county have turned their attention to the raising of milk, they keep their cows much better than when they made butter. At that time they depended on their pastures to keep their cows during the summer, or rather they made butter only during the season when their pastures afforded food for their cows, and kept them dry during the winter. The cows came into milk in April and May, and went dry in October and November. The extensive meadows in the county furnished hay of a quality that kept the cows in tolerable condition. Many stocks of cows were kept entirely on this hay and the corn fodder afforded by the farm, and no English hay was fed to them until about the time of their calving. But few farmers gave their cows meal, or any other grain. What grain they gave to their stock, was given to their working oxen. Now, as they must keep up about the same amount of milk through the year, the whole plan is changed. They are compelled to keep two sets of cows, one for the summer, and one for the winter. Those for the winter come in in October, and are made, by high feeding and great care, to yield nearly as much milk through the winter, as the other set which come in in April and May.

The dry cows, in the winter, are kept on good hay, with sufficient roots or grain to keep them in good condition, so that they may bear high keeping as soon as they come into milk. Those which give milk in the winter are kept on good hay, oats, and corn fodder and roots, with as much shorts, Indian-meal, oil-meal, rice-meal, or other grain, as they will bear. They are kept in warm barns the whole time, being only turned out twice a day, for a few minutes, to drink. They are fed with great regularity, receiving their grain at regular hours. The usual mode of giving grain is to mix it with hay, cut and moistened. This is mixed in a feed-trough on rollers, and dealt out in equal portions to each cow. Some prefer to mix the grain with water, and give it in the form of swill. When there is a ready sale for the milk, it is an object to make each cow eat as much as possible.

The summer cows are usually turned to pasture about the last of May. They are kept in the barn during the night, usually

receiving a fodder of hay, or of cut feed and grain, in the morning, before they are turned out. By the latter part of July, when the pastures begin to fail, green corn is fed to them at least once a day. Great pains is taken to furnish them an abundance of pure water. They are generally carded once a day, and kept clean, and milked at regular hours. The care and attention bestowed upon cows is much greater now than formerly. Their droppings are thrown into the cellar twice a day, and mixed with loam or muck, and thus large quantities of compost are made, by means of which the farmer is enabled to top-dress his hay lands, and to raise green crops for summer feeding. The general use of barn-cellars has greatly increased the quantity and improved the quality of the manure. This method of preparing and keeping manure has become a necessity to the milk-raiser. He can hardly succeed without it. Without quick and strong manure, he cannot bring forward his green crops, or raise the large quantities of corn and roots which his business requires. The use of urine or other liquid manures is being adopted, to a limited extent, by those who practise soiling in whole or in part. This method of applying top-dressing to grass lands enables the farmer to cut two, or even three large crops in a season, from the same land. It should be applied immediately after a crop is taken off. Most milk-raisers practise soiling in connection with pasturing, to some extent. By the use of liquid top-dressing on a few acres of land, they may keep double the number of cows which their pastures will enable them otherwise to keep. Many farmers send their winter cows, for three or four months, into the pastures in New Hampshire. When they have access to good pastures, within a reasonable distance, this is a good practice, as it enables them to appropriate all their home pasturage to their cows in milk. The great difficulty with milk-farmers is to provide summer keeping for their cows, as there are many more cows kept in the county than the pastures alone will feed. The deficiency must be made up by grain or green crops; and, as these last are both cheaper, and yield more milk, various methods are resorted to, to obtain a supply. Southern corn, sown in drills, is chiefly depended upon. Grass is fed green, to some extent, before the corn is grown sufficiently. Oats are some-

times sown in the latter part of July, or the first of August, and fed in the autumn, after the corn begins to dry, and is a very good crop for the purpose, as it will keep green till the end of October, when turnip-tops and flat turnips come into use. Millet affords a good crop for August, and makes a good variety with corn. The great desideratum is a green crop for June and July. I know not, from any extensive observation, how far the rape or colewort might be made to answer the purpose; but it is used in some sections of England and Germany, and I think it is worthy a trial. If set early in October, on good land, it will be in bloom in June, and yield a large amount of food highly palatable to cows. The turnip culture is not practised so extensively in the county as it should be. Turnips do not yield milk of so rich a quality as grain or carrots, and the farmers who formerly made butter do not hold them in much esteem; but in respect to the quality of the milk they yield, they are superior to green corn-stalks, and those who feed largely on corn in the summer, should not object to the free use of turnips in the winter. This prejudice is wearing away, and turnips and mangolds will come into more extensive use.

The turnip can never be made to yield as largely in our climate as in England. It is furnished with large, porous leaves, and derives a great portion of its nourishment from the atmosphere. The moist climate and marly soil of England fit that country peculiarly for this crop, and it is because of these adaptations of its soil and climate, that it is a favorite crop in that country. But if it is sown in the latter part of July, there is usually sufficient moisture in August and September to bring forward a profitable crop.

The mangold is less extensively cultivated than the turnip, but would undoubtedly be valuable for spring feeding, as it keeps better than the turnip, and is more mellow and better food in the latter part of winter and spring than the turnip. The mangolds, when given in the fall, are apt to scour the cows, but after they have become ripened by time, they do not produce this effect. The mangold requires better soil and more manure than the turnip, and more labor than the flat turnip. This is the great reason why our farmers have gone less into its

cultivation. The flat turnip can be raised after another crop, and it is the general practice to sow it in the cornfield, at the time of the last hoeing, or to plough a piece of grass land after mowing, and spread on a light dressing of compost, or some ashes or lime, and work it in with the harrow, and then sow the seed broadcast. In this way the crop is not much troubled with weeds, and no cultivation is required but thinning when the plants are too thick. When sowed among corn, from two to four hundred bushels to the acre are grown on tolerably good land, without injury to the corn, as the turnip grows chiefly after the corn begins to ripen. From three to four hundred bushels per acre are raised on grass land, according to the quality of the land and the amount of manure applied. The mangold requires a deep, fine tilth, and a heavy dressing of manure, and must be sowed in May, or certainly by the first of June, and requires cultivation through the season. This crop is found to be much improved by a dressing of salt, at the rate of about one hundred pounds to the acre. But after they are well thinned, the cultivation may be done by the wheel-hoe or hand-cultivator, and the crop is larger than that of the turnip. From half a bushel to a bushel of roots are usually given to a milch cow in a day. Some persons give the turnip immediately before milking, that the cow may have the longest possible time before the next milking to get rid of the flavor of the turnip. After cows become accustomed to feed on turnips, the flavor of the milk is very little affected by them. In every town in the county, there are some farmers who continue to make butter. They generally have their cows come in in the spring, and let them go dry in the winter. They do not feed as high as the milk-raisers. They feed out their corn fodder and poorer hay in the early part of the winter, and reserve their good hay until the spring. They give roots or grain occasionally through the winter, and the better class of farmers give meal to their butter cows, from the time they calve till they are turned out to grass. What is called cob-meal, that is, corn and cob ground together, is generally used. Indeed, most of the corn fed to cattle, of every kind, is now ground in this way. As there is but four or five per cent. of nutriment in the cob, there is but little gained

by this mode, except that the labor of shelling the corn is saved. When there is a good demand for milk, the farmers sell their calves as early as they can. Some dispose of them at a week old, and some at two or three weeks. The milk is thought to be worth more than the growth of the calf.

Marketing the Milk.

The value of the milk made in the county, according to the returns to the Secretary of State, in 1855, was $348,948. It is probable that the amount is somewhat greater at this time, although during the present season quite a number of farmers have turned their attention to the making of butter. The producers, for some years past, have obtained from three to four cents a beer quart for milk in the winter, and about two and three-fourths of a cent in the summer, delivered at their own houses. Very few of the producers now carry their own milk to market. It is put up in tin cans furnished by the milk-merchants, and taken daily at the houses of the farmers, and conveyed in wagons to the railroad depots; from thence it is conveyed by the cars to Boston. The cans are packed in ice, by which the milk is thoroughly cooled. The milk, as soon as drawn from the cows, is mixed in a large tin canister, to make it of uniform quality. It is then drawn out into the cans; the cans are then placed in cold water, until the milk is well cooled, when it is ready to be delivered to the agent of the milk-merchant. Some of the farmers carry their own milk to the depot, daily, for which they are allowed from one to two cents per can, according to the distance. Two sets of cans are necessary. On each afternoon, the man who takes the milk in the morning returns the cans of the previous day. They are then carefully washed, and scalded out with boiling water.

In 1855, the milk made in Lexington amounted to $52,626; in Waltham, to $33,270; in Concord, to $47,490; in Dracut, to $25,291; in Lincoln, to $18,727; in Burlington, to $18,000.

For some years, a law of the State has established wine-measure as the legal measure of milk; but most of the

merchants have continued to purchase of the producers by beer-measure, although it is understood that they have sold by wine-measure. A large part of the milk carried into the city by the cars, is taken by a class of middlemen, who supply it to their customers. These men sell it by wine-measure. This difference in measure has been a constant source of irritation; but so long as the merchant can sell eight or nine quarts from a can containing seven, he will not willingly purchase by wine-measure. A wine gallon contains 231 cubic inches; a beer gallon, 282. The difference is 51 inches. The difference between seven quarts beer-measure and seven quarts wine-measure, is eighty-nine and a quarter inches, or a little more than one and a half quarts wine-measure. This difference is gained by the milk-merchant on each can of seven quarts, making a fraction over six cents on a can, or six dollars on a hundred cans. Various attempts have been made to have a can adopted as a legal measure, and sealed like other measures. A law was enacted during the last session of the Legislature, requiring the cans to be sealed, and marked by figures showing their contents in wine-measure, and requiring the cities, and authorizing towns, to appoint inspectors of milk, and making the sale of adulterated milk penal. This is well so far as it goes. It would be better to require the cans to be of uniform size. Now they differ from one to two quarts in size—so that a can means no particular quantity. It would be a great convenience to the public, as well as an act of justice to the producers, to have the size of the can fixed by law.

A portion of the milk raised within a few miles of the city, is daily carried to market in milk carts, and delivered to regular customers. The milk from Lexington, West Cambridge, and Waltham, is marketed in this way. The carrier takes it daily at the houses of the producers. West Cambridge formerly produced a large quantity of milk; but market gardening has now superseded the milk business in that town, to a great extent. It is found that their lands will yield larger returns from vegetable culture than from making milk. But more milk is made in the towns in the upper part of the county. Milk is a species of produce that can be carried to market regularly, and in uniform quantities, and at less expense of freight than

vegetables. Hence, towns thirty or forty miles distant, can compete in the milk business on more equal terms, with the towns in the vicinity of the market, than they can in the raising of vegetables for the daily market. Milk is now carried fifty miles, daily, to the city; but I think not in so large quantity at the present time, from that distance, as it was three or four years ago.

Grass Culture.

Formerly, when the meadow hay in the county was much better than at present, and the farmers devoted their attention to butter-making, large quantities of hay were carried from this county to Boston; but the milk business requires a much larger quantity of good hay, and at present, although the hay has greatly increased in quantity and improved in quality, it is nearly all consumed at home. The meadow hay, in its present condition, is of little value to the milk-raiser. He must feed the best hay he can get, and his constant study is to raise the largest possible crops of the most nutritious hay and grass. Clover, herdsgrass, and redtop, are the grasses chiefly cultivated, and these are put upon the best lands. Formerly, grass seeds were sowed, after corn, with oats or other grains, in the spring, and this practice is continued to some extent. But on moist lands, the more common practice now is to plough in August or September, spread on a dressing of compost, and sow grass seeds, and harrow and roll the soil. The September rains bring up the seeds, and it gets well rooted before the setting in of the frost. The next season, about the latter part of July, a good crop of hay is taken off. Thus nothing is lost except the fall feed, and on land requiring ploughing, this is of little value. The rotting sod and the compost added, make a deep tilth, which will yield several good crops, after which the land is treated in the same way again. Sometimes, when the grass seeds are put on early in August, turnips are sown at the same time, and a good crop of turnips is obtained. When grass seed is sown with oats or other grain, it is not as sure to catch, especially if the oats are thick and rank, or happen to lodge.

When the latter circumstance occurs, the tender grass generally dies on those spots where the oats lie on the ground. Fall seeding is now coming into general use on milk farms. Where cows are kept in the barn at night, and their food consists in part of green crops, manure is made during the summer, and enables the farmer to seed down conveniently and profitably in the autumn. Top-dressing on grass lands is practised to some extent. Ashes is found one of the most effectual means of keeping grass in a luxuriant condition. Liquid manure will probably be found the cheapest and most profitable dressing, when the urine of cows can be conveniently applied. Most grass lands may be kept in a fertile condition by means of top-dressing, at less expense than in any other way. The best time to apply top-dressing, if we regard only the effect of the manure applied, is in the early spring, about the time when the grass begins to start. But on lands most likely to be benefited by this treatment, there is this objection: the soil is full of water, and soft, and the oxen and wheels cut it up badly, leaving the surface broken and uneven, and unfit for the scythe or mowing-machine. This leads most farmers to cart their manure on to the ground in the fall or winter. Some portion of the value of the manure is lost in this way. On land that has been laid down several years, on which the sward is firm, spring dressing may be practised with advantage: Even winter dressing, on many fields, is better than frequent ploughing, inasmuch as it is attended with less expense. When moist lands are seeded down in the fall, they are apt to be thrown by the frost in the ensuing winter. It is a good custom to roll all lands in the spring, that were seeded in the previous autumn. This presses into the soil many roots that are thrown up, and would otherwise perish, and leaves the surface in good condition for the scythe and rake.

Since the demand for good hay has so much increased, and especially, since fall seeding has been adopted, the crop of grass per acre, has greatly increased. On some farms it has doubled. A much greater breadth is now devoted to grass, and less attention is paid to the culture of the small grains. More attention is paid to the harvesting of hay, as it is found that well-cured hay is the most nutritious. When the growth is luxuriant, the

grass is apt to lodge, and unless it is cut early, it will sour at the bottom, and become slimy, which destroys its flavor, and injures its quality. It is now cut earlier than formerly, and good farmers aim to get it into the barn without its becoming too dry, that they may save its leaves and aroma. Hay-caps are coming into use, by which much injury from rain is prevented, and the process of drying much expedited. Those who use mowing-machines are able to cut larger quantities at a time, and select only good weather for the work, and thus get in the crop with less exposure to the sun and weather.

In 1855, the value of the hay crop in the county was $1,483,950. Probably the crop for the present year is not much short of $2,000,000 in value. In some of the towns it is estimated that the crop of English hay has doubled in ten years; so that I think the above estimate is not too large for the present time. Should the making of milk continue to be the leading agricultural business, the crop of hay will be greatly increased beyond its present amount.

The farmers are just beginning to learn the importance of draining their low lands. Tile draining has been introduced only to a very limited extent. This will afford the means of converting many portions of land that now yield only poor hay, into land capable of yielding good grasses. Large portions of the very best grass lands in the county are yet unreclaimed. Many thousands of acres on the Sudbury and Concord Rivers, are capable of being made to yield large crops of good hay, whenever the cause that has made and still keeps them poor, shall be removed. The application of meadow mud to the sandy soils will cause them to yield much larger crops, and for a much longer period, than hitherto. The value of this material for such soils is now fully appreciated by the farmers of the county, and to its use in the form of composts and as an absorbent of liquid manures, the improvement already made is, in great measure, due. This will be used more extensively in time to come, than it has been heretofore. By these means, especially by the draining and seeding of low lands, the crop of hay now harvested in the county, may be doubled without diminishing other crops.

Restoring Pasture Lands.

The great want of the milk-raisers and butter-makers at the present time, is the restoration to fertility of their exhausted pasture lands. There are thousands of acres in the county that formerly yielded good pasturage, but which now yield very little grass; they are covered with small bushes and mosses, and yield so little grass, that ten acres will scarcely keep a cow. Many of these pastures are rocky and hilly, and cannot be ploughed. Many of them lie at a distance from the homes of the owners, and where they are susceptible of tillage, it would be too expensive to transport manure to them, even if the owners had it to spare. One of the most difficult questions to answer is, how shall such pastures be restored to fertility? In answering this question, we must first inquire how they have been exhausted, and of what have they been exhausted? They have been exhausted by over-cropping for a long succession of years. Many of them have been fed by neat stock for three or four generations, without the addition of any fertilizing material, except the droppings of the animals feeding upon them; and as this dries and becomes hard upon the surface where it falls, it is of but little value. The grass is cropped short, and but little of the growth of any season is left on the ground to increase the quantity of carbonaceous matter in the soil. When grass is kept short, it can make but little root, for the material of which the root is formed must be elaborated in the leaf. When the leaf is eaten off constantly, material cannot be organized for the formation of any tissue. There is then but little root to decay and form humus: we accordingly find the turf in old pastures very thin, unlike the turf on mowing lands, where the roots grow in length and number, while the blade is maturing for the scythe. We do not expect mowing lands without irrigation or top-dressing, to continue to yield crops for successive generations. Why should we expect it of pasture lands? Many of these lands are hilly, and when the sward is thin everything soluble in the soil is dissolved and washed into the lower levels. This is true even of the mineral elements furnished by the weathering

of the granite upon the surface. On the borders of the rivulets caused by springs from the hill-sides, and in the basins where the wash from the hills is deposited, we find the grasses still growing luxuriantly. The grasses growing upon these old pasture lands require lime and humus; so long as they can obtain a supply of these elements, they will thrive. But the grasses, with what lime they have obtained from the soil, are taken off by the cattle. It is of this that their bones are formed, and a large percentage is found in milk. A large amount of lime is thus taken from the soil annually, and to the depth to which the grass roots penetrate, it is completely exhausted of it. Little carbonaceous matter being added by the decay of the roots and grasses, the soil has become exhausted of this indispensable element of fertility also.

In some of the pastures in New Hampshire, many milch cows and young growing cattle die from what is there called the bone disease, which is a condition in which the excretion of bony matter goes on more rapidly than its secretion. The grasses do not furnish the bone-making material so fast as it is carried off by the excretory vessels, and the bones become soft and yielding, and cripple under the weight of the animal. The remedy applied by the farmer is bone meal; this is given mixed with Indian meal or salt: the same remedy applied to the soil, would prevent the disease in the animals, inasmuch as it would reach them through the grass. When exhausted pastures can be ploughed and reseeded, this is doubtless the most expeditious remedy, especially if a dressing of manure or lime be given them. The ploughing brings up a new portion of soil containing the needed mineral elements, and destroys the mosses and bushes and worthless plants, and introduces sweet grasses. When this has been done effectually, they may be kept in good condition by care not to overstock them, and by top-dressing once in two or three years, with compost, or liquid manures, superphosphate, ground bones, plaster, or lime in almost any form. It will be in vain to expect a pasture, however thoroughly it may be reclaimed, to continue to yield good feed for an indefinite number of years, without the addition of something to supply the place of that which is being constantly carried away.

When the surface of old pastures is in such a condition that it cannot be ploughed, I would recommend the sowing broadcast of plaster, superphosphate, or ground bone, in liberal quantities. A half a ton of plaster, five or six hundred pounds of superphosphate, or a ton of lime, to the acre, are the smallest quantities from which permanent benefit can be expected. The English farmers use lime in much larger quantities than we are accustomed to use it, and they find advantage from it, even on lands containing more lime naturally than do ours. When ashes can be obtained, they may be used with lime to great advantage.

But I have little doubt that the keeping of sheep would be the most effectual means of restoring rough, rocky pastures, to a fertile state. There are, as I have already remarked, few or no sheep kept on farms which formerly fed large flocks. The two principal objections to the use of sheep to restore such pastures, are the high cost of fencing materials, and the great number of dogs kept in the villages for no earthly advantage to any one. The law of last winter will tend to obviate the latter objection. The former cannot be so easily overcome. Still there are many farmers that can afford the expense of properly fencing their lands. When this cannot be done, it is probably the best thing to take off the stock entirely, and allow such lands to grow up to wood, unless they can be reclaimed by some of the means above suggested. If the large breeds of sheep are kept, which are the most profitable for mutton, the fencing will not be as expensive as when the smaller breeds are kept.

This subject deserves the special attention of farmers in the county, whose pastures are becoming exhausted, and especially at the present time, when the supply of milk is quite up to the demand. In most parts of the county so far removed from the cities that manure cannot be transported to them profitably, it is believed that the raising of sheep with special reference to the produce of mutton may be rendered quite as profitable as the making of milk, and they can be kept on pastures which will yield but little keeping for milch cows, and under their use the pastures may be restored to their former fertility.

There is another description of land in the county chiefly used for pasturage, but which is of little value, having become ex-

hausted of its fertility. I refer to what are called pine plains. They were formerly covered with pine wood. After the wood is cut off, they are generally cropped with rye, and then pastured a few years, and then again sowed with rye. No grass seed is sowed. A little clover and sorrel usually succeed the rye. Occasionally, when such land lies in the vicinity of their homes, farmers cultivate on it a crop of corn, putting on a light dressing of manure. This crop is followed by rye, sowed at the last hoeing of the corn. As might have been expected, such lands have become almost barren. Many persons are leaving them to grow up to pine and birch wood, and perhaps in many places this is as good a course as can be pursued. But in the neighborhood of villages, and in situations where land is valuable, some attempts to reclaim them by ploughing in green crops, have been made with good success. The following course was pursued by one gentleman, and he was well satisfied with the result. He ploughed the land in the spring, about six inches deep, harrowed, and sowed buckwheat. In July, or when the buckwheat was in blossom, he ploughed it in, and sowed buckwheat again. About the last of September, he turned in the second crop. The next spring he sowed oats, and turned them under in July, and sowed redtop and clover. The following year he mowed a crop of hay, and then pastured about three years, dressing, each year, with lime or plaster. In this process the chief expense is the labor and seed; but the ploughing is easy, and may be performed by one yoke of oxen. Such lands are always benefited by lime. When mud can be composted with lime on the ground, and spread and ploughed in, they may soon be brought into a tolerably good state for pasturage; but when they are wanted for pasturage, they should be seeded with grass seeds, without taking off a crop of grain. What grasses they yield, are sweet and nutritious. Such pastures are valuable in the early part of the season. They will of course become dry after July. Were premiums offered by the county societies, for the best conducted experiments in reclaiming old pasture lands, no doubt good results would follow. It is an object well deserving the offer of liberal premiums.

Indian Corn.

The culture of this grain is increasing in the county. There are now but two counties in the State that produce more corn than Middlesex. The value of the corn raised in the county at the present time is not less than $400,000 per year. Corn stover is considered a valuable food for cows. When well cured, it is estimated to be worth more than half as much as good hay. The farmers now raise larger crops per acre than formerly. Thirty years ago, from twenty-five to thirty bushels per acre was the average crop. Now it is estimated at forty; and fifty or sixty bushels are common crops. Indeed, no good farmer is satisfied with less than fifty bushels per acre. Corn is the favorite crop of all farmers. The milk-raisers consume all the corn they raise, and most of them purchase large quantities in addition.

Corn is considered less exhausting to the soil than most other grains, and, as it requires to be cultivated through the season, it is one of the best crops for breaking up and ameliorating sod land. From twenty to twenty-five loads of manure are usually applied to the acre. Some prefer to spread it all on the grass, and plough it under, and then harrow and furrow the surface, without breaking the sod, and to apply plaster, ashes, or guano in the hill. Others plough under about two-thirds of the manure, and put the remaining third in the hill. This brings forward the crop early, and when the roots find the more deeply-buried portion, they continue their growth vigorously through the season. Perhaps this method is as certain to give a good crop as any method whatever. On stubble land, it is common to plough in the whole of the manure. The corn plant grows slowly at first, and needs some stimulating manure to bring it forward, until its expanding leaves and spreading roots enable it to seek its food over a wider space of both soil and atmosphere. Corn effects most of its growth in July and August. It requires a warm sun and intense light to bring its assimilating organs into full exercise. The small varieties only are adapted to our climate. The Canada corn, the King Phillip corn, the Lathrop

corn, and the common twelve-rowed corn, or a mixture of these, are the varieties chiefly cultivated. The Canada is the earliest kind, but it yields a smaller amount. The King Phillip probably yields the largest crop, but is not as sure to ripen. The butts of the cobs are apt to remain soft, and cause the ears to mould. Since it has become common to grind the corn and cob together, the farmers have sought a kind that has a small cob, and at the same time yields a good quantity of grain. Some varieties have been obtained that approach this standard of perfection; but the several kinds of corn mix freely, and it is only by a careful selection of seed that a good variety can be kept, even if once found. As the corn depends upon a hot sun for its growth, and as during the period when the sun pours his rays most intensely we are most subject to drought, corn is apt to suffer for want of moisture. The best preventives against the effect of drought are deep ploughing and early planting, so that the corn may get well rooted before the coming on of the drought, and frequent stirring of the soil. Stirring the soil with the cultivator or the hoe in a dry time, when the corn is parched, will cause the rolled-up leaves to expand, and assume a fresher and more healthful hue. The more intense the drought, the more diligently should the ground be stirred.

Corn is liable to injury from early frosts. To guard against this, many farmers now cut up the corn at the ground as soon as the kernel is well glazed, and bind it in bundles, and cure it in small stacks or shocks. The fodder, when cured in this way, is doubtless better than when the tops are taken off and the butts are allowed to stand in the field till they become perfectly dry and hard. If the corn is cut before the kernel is sufficiently ripe, the latter will shrink, and not be as heavy as when it ripens on the root. But the difference is not more than two or three pounds to the bushel, and perhaps this loss is made up by the increased value of the stover. In a backward season, when the crop is late, this is the safest way to secure it. It is getting more into use than formerly.

Since the milk-farmers have adopted the habit of feeding their cows on grain, the demand for corn has increased. It will continue to increase, unless cotton seed or some cheaper grain

can be made to take its place. Large quantities of Southern corn are grown to be fed to cows, in a green state. It is thought that no plant will yield so much food per acre as this. It is sown thick, so that the stalks may not grow large, as the cows do not readily eat them when large. Considerable quantities of this corn are cultivated, and cut and dried for winter fodder.

Fruit Culture.

This is an important branch of husbandry in the county. It has greatly increased within a few years past. Apple trees were formerly cultivated to a considerable extent, in most towns of the county, for the making of cider. But the old apple trees used for this purpose have mostly disappeared, and trees bearing fruit of a much better quality have taken their place. Apples are now cultivated chiefly for the table and the market. The value of the apples raised in the county in 1855, was $300,000. A great number of trees have come into bearing since that time, and the present value cannot be less than $350,000. Great attention has been paid to the introduction of the finest varieties of apples, and this county produces a much larger amount of good apples than any other county in the State. There are many nurseries in the county, which furnish thrifty trees of all the desirable varieties.

The Baldwin, which is the most saleable apple in the market, originated in Wilmington, in the eastern part of the county. This a hardy, free grower, and abundant bearer. The fruit is large, fair, of a fine red color, and rich flavor, and keeps well through the winter. More apples of this variety than of any other, if not than all others, are raised in the county. Baldwins are worth from two to four dollars a barrel, according to their quality and condition.

The Hunt Russet, which is one of the best varieties, originated in Concord. This is a hardy tree, and free bearer. The fruit is smaller than the Baldwin, of a bright russet color, with a red blush on one side, very spirited in flavor, and keeps through the year. There is no apple more highly valued by those who are acquainted with it.

The Porter and Fall Pippin are fine varieties. Large quantities of Porters are raised, and marketed in the autumn.

The Hubbardston Nonesuch, the Pearmain, the Roxbury Russet, and the Greening, are among the most common and abundant varieties, and are raised in large quantities. Many other varieties have been lately introduced, and promise to do well.

Many thousand barrels of apples raised in this county, are now annually shipped from Boston, and this trade is increasing. They are carried by steam-boats to Maine and the British Provinces, and when the crop at the South is short, New York and the southern cities look to Boston for a supply.

Apples are packed in barrels, and carried to market in wagons, or by the cars. The fall apples are mostly carried by wagons immediately after they are taken from the trees. The winter apples are separated into two or three sorts, and packed carefully into barrels, and large quantities are sent to market by cars.

Trees are set out and cultivated with greater care than they were in former days. It is found important to select young thrifty trees from the nursery. Trees that have stood several years, and become stunted, are of no value—not worth setting out. The tree should be taken up while in a vigorous growing state, and should be removed with its entire roots. Great care should be taken that the roots do not become dry. The rootlets, upon which the future growth of the tree essentially depends, are too apt to be left in the ground by the nurserymen, in their haste to remove the tree. The ground should be cultivated, and well manured, at least two years before being set to trees. In selecting ground for an orchard, care should be taken to select that upon which the water does not stand in the winter, and from which the surface-water is freely drained in the summer. Nothing is more injurious to young trees than to have their roots immersed in water, for a considerable time. A granite or limestone soil, or a clay loam containing a good share of sand, is well adapted to the growth of apple trees. A bed for the tree should be made by throwing out the soil eighteen inches deep, and from four to six feet in diameter,

according to the size of the tree. This should be filled with soil well mixed with dry compost to within six or eight inches of the surface. The tree should be placed, and the roots carefully spread by the hand. Soil should be sprinkled upon them, and filled in around them by the hand, and the whole covered and pressed down with moderate force. The greatest care should be taken not to injure the roots in the process. It is a common fault to cover the roots too deeply in the ground, so that they do not feel the genial warmth of the sun till late in the spring. Where the ground is not properly drained, if set too deep, the roots are kept too moist for the health of the tree. On moist loams, or on springy lands, under draining is the best possible preparation for an orchard. The trees will start earlier, and have a longer season for growth. The soil is kept mellow to a much greater depth, and the roots will spread more freely. Trees should not be set nearer to each other than from thirty to thirty-five feet, and care should be taken during the first years of their growth, to give their heads a uniform symmetrical shape. All limbs that require removing, should be taken off, if possible, when small. Large limbs cannot be taken from trees without more or less injury. When it is necessary to do this, the stumps should be covered with some varnish that will exclude the water. The proper season for pruning has given rise to much dispute. It was formerly the custom to prune in the spring, because this is the most convenient season. But any one that will carefully observe the many dead and black stumps from which the limbs have been removed in the spring, and the blackened and dead bark extending from them down the trunk, and compare them with the stumps from which the limbs were removed after the foliage was fully grown, will be convinced of the impropriety of spring pruning. My own conviction is that limbs should never be removed from fruit trees, except at the season when wood is being formed. At that season, the bark will grow so as to cover the edge of the cut wood, and the air and water will be prevented from penetrating between the bark and the wood of the stump, and the stump will remain in a healthy condition, and if it is not too large, will soon be covered

with new bark. Limbs that cross and chafe each other must be removed.

As the tissue-forming material must all be formed in the leaves, excessive pruning is always injurious to the growth of young trees, as thereby so much foliage is removed, that sufficient nutriment is not prepared for their wants. The subject of pruning needs to be better understood by the fruit-raisers.

Stone fruits bear pruning badly. Pears, and especially dwarf pears, permit but little pruning. It is generally better to allow them to grow as they are disposed, and retain all their foliage. If shoots are taken from them at all, it should be in the first year of their growth.

Grafting should be done upon small limbs, and the stumps well protected from the weather. The old method of applying a ball of clay and a bandage of cloth to the stump, protected it from the drying of the bark by the direct rays of the sun, and is more safe than the modern application of a coating of wax. If wax is used, it may be covered with clay in addition. Many thrifty trees are annually destroyed by setting scions on too large limbs, and by removing too many limbs in one season. Sufficient foliage is not left upon the trees to enable them to mature the sap necessary to form bark to cover the wounds, and to effect a union between the tree and the scion. The whole subject of pruning and grafting is one of much importance. But I have not space to discuss it fully.

Pears.

A good deal of attention is paid to the cultivation of pears, and with considerable success, especially in the eastern part of the county. The cultivation of dwarf pears has been followed by indifferent success in many instances. After one or two crops, the trees become diseased, and make small returns for the labor bestowed upon them. They grow, at first, luxuriantly; but soon the roots become incapable of sustaining the task required of them, and, even if they sustain the life of the tree for a few years, are unable to supply material for a crop of fruit. Pears on pear stocks, even though of slower growth, yield surer and more permanent returns. No finer pears are to be found in

the country than are seen on the tables at the Agricultural Fairs, in the County of Middlesex.

Brighton, Cambridge, Melrose, Malden, and Newton, are celebrated for their fine pears. In 1855, Brighton contained five thousand pear trees—more than double the number in any other town in the county. The clay soils in this section seem peculiarly suited to the production of this fruit. They receive very high culture. It is common to keep the ground around them mulched through the year.

Peaches.

In many towns in the county, there were formerly raised large crops of fine Peaches. Lincoln and Acton were noted for their peach crops. But the disease termed the yellows has destroyed most of the trees. Some are still raised in Littleton and Acton, upon hilly ground, and a few in other towns have escaped the disease. But little attention is now paid to their cultivation. Some nurserymen are beginning again to raise trees, and it is to be hoped that a new generation of trees may afford a supply of this delicious fruit.

Cherry trees appear to be undergoing an epidemic disease similar to that which has destroyed the peach trees; and it is feared that many of them will come to an untimely end.

Small Fruits.

Large quantities of Currants are raised in the county. They are easily cultivated, requiring only a good loamy soil, and to be kept free from weeds.

They continue to bear freely for many years, and afford a delicious acid fruit, at a season when other fruits have not matured. The red Dutch currant is the most common. Several other varieties have been introduced, and thrive well. The usual practice is to set them in hills, from three to four feet apart, and to cultivate the ground with the hoe. A shovel-full of compost or dried peat thrown upon each hill in the fall is all the manuring they require.

Increased attention has been paid within a few years past to the cultivation of the Strawberry. Large quantities are now raised in the towns in the vicinity of the market.

In West Cambridge, Belmont, Somerville, and Brighton, many acres are appropriated to their culture. The crop is said to be, in some instances, worth more than $1000 an acre.

Not much attention is paid to the culture of other small fruits, as the Gooseberry, Raspberry and Blackberry.

Cranberries.

A large amount of Cranberries is annually produced on the wet meadows in the county. In 1855, the value of the crop returned was $37,288. Probably this was not two-thirds the amount. Cranberries are worth from $2 to $4 per bushel, according to their abundance. More than $20,000 worth was often grown on the meadows upon the Sudbury and Concord Rivers, and their tributaries. Within the last few years, the crop upon these meadows has been almost entirely destroyed by the water let down upon the meadows from the reservoirs erected by the Boston Water Board, just at the season when the berries are formed. Water does not injure the vines, even if it cover them during the entire winter ; but it destroys the growing fruit, if it covers it even a few days. Some attempts have been made to cultivate cranberries on upland. But it is found much cheaper and more profitable to raise them upon wet lands that are adapted to their nature and habits. On such lands they are easily produced, and when the flowage can be regulated, they are generally productive. They are occasionally destroyed by early frosts in the autumn.

Potatoes.

No crop in the county is of more importance than the potato crop. Large quantities of early potatoes are raised for the market. They are planted as early as possible, in dry, warm soils, and are well manured and cultivated. These potatoes are dug and carried to market in July and August. After the crop is taken off, the land is often sowed to turnips, or seeded with grass or winter rye. Potatoes at that season have been worth $1 per bushel for several years past. The early potatoes do not generally yield as many bushels per acre as the later ones. The

late crop is worth in the market from sixty to seventy-five cents per bushel. The white Chenango is the only early kind which yields a sufficient crop to make it an object to cultivate them for the market, unless it be the Jackson Whites, a variety recently introduced. The Chenangoes have rotted badly for some years, so as to deter most farmers from raising them on dry soil, as a late crop. The only soil on which the crop is at all sure is peat soil. This, when tolerably drained, and the potatoes are planted with plaster in the hill, rarely fails to give a crop of sound potatoes. Many experiments have been carefully instituted, in order to ascertain the cause of this wide-spread disease, and to discover a remedy. They have been planted on every variety of soil, and with every variety of fertilizer, and they have been cultivated in various ways. But no effectual method has been discovered to prevent or avoid the disease. Planting deeply in a dry soil, and hilling deeply, before the disease shows itself in the stalk, are believed to be the most effectual preventives. A dry, peaty soil, with only plaster in the hill, has been found to give the best results. But where disease does not show itself, the potato is much less prolific than before the disease was known. From three to four hundred bushels was formerly no uncommon crop. Now one hundred and twenty-five is considered a good crop, and that upon land which will yield a larger crop of corn or grass than in former years. The loss of fecundity seems to be not in the soil, but in the potato itself. The varieties most cultivated at present are the Davis Seedling, the Chenango, the California or Jenny Lind, the Gillyflower, the Jackson White, and the Carter. Of these, the Jenny Lind is the greatest bearer; but the Davis Seedling is preferred by most persons for the table, and is less subject to disease than any other. It keeps well, and is eatable till the new crop comes in. The value of the crop depends upon the price in the market, which is much affected by the price of potatoes from Maine and Nova Scotia. The crop from these places does not reach the market in season to affect the price of the summer crop. In former years, potatoes were fed largely to swine and neat stock. Now no one raises them for this purpose. In 1855, the value of the crop in the county was $475,000. But the value has fluctuated for some years

between $375,000 and $475,000. The potato crop is raised at much less expense than the corn crop, and much of it on land that will not yield corn successfully. Were it not for the greater expense of getting the crop to market, it would be by far the most profitable crop cultivated. When manure is used in the cultivation of potatoes, it is common to spread it, and plough it in thoroughly. Lime, plaster, or ashes in the hill, keeps the potatoes free from worms, and causes their skin to be smooth. When manure, especially stable manure, is applied in the hill, they are thought to be more subject to disease. Light, strawy manures, which are of little value for corn, do well for potatoes. Potatoes after a rye crop are found to do well. In this case, the stubble should be ploughed in in the fall. A gentleman in Concord has practised this rotation for some years, and always with success, getting good crops with but little loss from rot.

Various methods have been resorted to, to prevent potatoes from rotting after they are dug, such as drying them thoroughly in the sun, before they are put into the cellar, sprinkling them with lime as they are packed in the barrels or bins, and keeping them from the air in pits sunk in the ground. They will doubtless rot more in large heaps, where they probably undergo a kind of heating. The best way probably is to dry them a few hours, and pack them in barrels. In small parcels they are not liable to heat.

The farmers now find it more profitable to sell their potatoes, and buy corn to feed their swine and milch cows. The crop is separated into three sorts. No. 1 is carried to market, No. 2 is reserved for planting, and No. 3 is given to the hogs. Repeated and varied experiment has proved that second-sized potatoes, when used for seed, will produce as large potatoes as will the largest size. In this respect, the analogy between them and the seeds of plants does not hold good. The tuber is not a seed. It consists of material prepared by the plant to nourish the bud or eye, which is a true bud, until it can form roots and leaves by which it can obtain from the soil and atmosphere its own nutriment. Many plants, as the tubers, the bulbs, and the lilies, lay up deposits of nutriment in reservoirs under ground, by which

the shoots of the following season are temporarily nourished. Each bud or eye has its portion of the nutriment assigned to it. The larger the tuber, the more buds belong to it. So that it often happens that the eye on a potato of moderate size has as much nutriment stored up for its future growth as the eye of a large one. If this explanation is correct, it accounts for the fact which has caused so much surprise, viz., that small potatoes will produce a progeny of as large a size as those of larger growth. Several seedlings of much value have been obtained by planting the seeds. The tubers from the seed require to be planted about five years in succession, before obtaining their full size, and before their value can be determined. Most varieties that have been produced, after a few years' cultivation show indications of disease, and should be changed for other varieties. Hence, it is desirable that every farmer should appropriate a few feet or rods of ground to the cultivation of seedlings, that new and valuable varieties may be obtained, from time to time, to supply the place of those that become subject to disease. Only a few of the varieties thus raised will be of any value. Yet a sufficient number will be found to keep up the supply of sound and healthy potatoes. Every man who makes the attempt to obtain a new seedling, as well as every man who succeeds, should be considered a public benefactor.

Grains.

The culture of Wheat requires the best land in the county, and considerable quantities of manure. Since the introduction of milk-raising, and the consequent increased demand for grass, the cultivation of wheat has been generally discontinued. As Rye is raised, for the most part, without manure, its culture is still continued to a considerable extent. When wood is cut from a dry or rocky soil, it is common to put on rye as a first crop. Under such circumstances, a good crop is usually obtained—sometimes twenty or more bushels to the acre. Some farmers, as has been already stated, are in the habit of putting a crop of rye, once in three or four years, on pine-plain lands. Such

land usually yields eight or ten bushels to the acre. Occasionally, rye is sown after corn on land of better quality. If the land has been well manured for corn, from twenty to twenty-four bushels is not an uncommon crop. For several years past, the straw has commanded a high price in the market, say from $14 to $18 per ton. This has induced the farmers to sow a greater breadth of rye. The very high price of wheat flour, for the past four years, has led some farmers to cultivate small quantities of wheat for their own use. Some good crops of from twenty to twenty-four bushels per acre, have been raised. Wheat requires a good soil, and a thorough preparation of the ground. Good corn land, that has been well manured and cultivated two years, is laid down to wheat and grass seed, and a good dressing of compost applied. Wheat is found to be a better grain than oats with which to sow grass seeds. With such a preparation, the crop rarely fails. Several varieties are cultivated. Spring wheat is chiefly sown of late. The black-sea and the blue-joint are the varieties chiefly used. If winter wheat is sowed, it should be put in in August, that the stools may get well rooted before winter. At the present prices of wheat and straw, this grain may be made a profitable crop. Twenty bushels, worth $1.75 per bushel, equal to $35, and $15 worth of straw is a good crop. If every farmer would raise his acre of wheat, he would not only be well paid, but would have the satisfaction of raising his own bread.

The milk-farmers now generally mow their oats while in the milk. Occasionally they are allowed to ripen. From forty to fifty bushels to an acre is a good crop. It was formerly the general practice to sow oats with grass seeds when laying down land in the spring. But since fall seeding has come more into use, oats are less cultivated. If oats are sown thick, they are apt to choke the young grasses. When oats are sown with grass seeds, five or six pecks to an acre are sufficient. The oats will be larger and better, and the grass seeds are more sure to catch, than when two and a half bushels are sown, which is the usual quantity. If oats are cut when in the milk, they make good food for cows.

Root Crops.

The value of Roots has never been fully appreciated by the farmers in the county. Their cultivation, with the exception of that of the flat turnip, makes a large draft upon their working capital, which is labor. Labor in the county is expensive. Hence, the culture of roots has never been as popular as in those countries where labor is cheaper. Still, roots are cultivated to some extent. Flat Turnips, Ruta-bagas, Mangolds, Sugar-Beets, Carrots, and Parsnips are cultivated, and all are wholesome and nutritious food for man and beast.

The Flat Turnip is the most easily raised, and has this circumstance in its favor, that it grows in a shorter time than any other root, and hence may be raised as a second crop, with corn, or after peas, early potatoes, or grass; or it may be sown with grass seed in fall seeding. The most common way is to sow the seed broadcast in the cornfield, at the time of the last hoeing of the corn, in July. It seems to interfere very little with the raising of corn, as its growth is chiefly made after the corn has attained its full size. The only labor is the harvesting. The milk-farmers begin to pull them in October and feed them, with the tops, to the cows. They are pulled in November, and the tops cut off and the roots stored in the cellar. They are chiefly fed out before the first of January. If they are intended to be kept till later in the winter, they are covered with straw or hay. They are quite equal to any other root for milk—at least, they will make as large a quantity, if not of as good a quality. In some instances, the turnip crop raised with corn is of equal value to the corn crop. They are usually estimated at ten cents a bushel, at the barn; 400 bushels are worth $40—equal to a corn crop of forty bushels to the acre.

The Ruta-baga requires the whole season, and cannot, therefore, be raised as a second crop. It requires a good soil and plentiful manuring. Superphosphate of lime is one of the fertilizers best adapted to this crop. They are sowed in drills, carefully thinned and hoed three or four times. The ruta-baga keeps better than the flat turnip, and is usually fed out in the latter part of winter.

The Mangold requires a rich, deep soil, and heavy manuring. The method of cultivating is much like that of the ruta-baga. It keeps better than the turnip; and is in condition to be fed out after the turnip is done. It will keep well into March or April. When fed in the early part of winter, they are apt to scour the cows; but in the latter part, they become ripened, and are very nutritious.

Carrots are cultivated to considerable extent. A deep clay loam is best adapted to them. They require much labor, and the crop is somewhat uncertain, it being subject to rust. It grows slowly in the early part of the season. Such soils as are suited to them are apt to throw up a vigorous growth of weeds, before the carrots are large enough to be weeded; and then it is difficult to remove them without disturbing the roots. From five to six hundred bushels to the acre are often raised. This root is very valuable for horses, and when fed to cows, yields rich milk. The following method of culture is most generally pursued; the ground is ploughed deeply, about the middle of May; about the first of June, a good quantity of compost, say thirty loads to the acre, is spread and ploughed in; about the middle of June, the ground is ploughed again, harrowed and raked; the seed is sowed in drills about eighteen inches apart. This repeated ploughing, at intervals, allows the seeds of the weeds to germinate, and destroys them. As soon as the plants are visible, the wheel-hoe is run between the rows. This is repeated as often as once a week. As soon as the plants are sufficiently grown to be readily seen, they are carefully weeded and thinned, leaving them about four inches apart. The first weeding and thinning requires time and patience; after this, there is no further difficulty; most of the after cultivation may be done with the wheel-hoe. Carrots are worth $10 or $12 per ton.

With a good supply of turnips and carrots for the fall and early part of winter, and mangolds for the spring, a good supply of milk may be kept up through the season. But most farmers prefer to feed with shorts, or Indian-meal, or a mixture of both, after their flat turnips have been eaten up. They think two quarts per day of meal which is worth five or six cents, will

make more milk, and keep the cows in better condition, than this value in beets or carrots. For fattening stock, most farmers prefer corn-meal. They say this is raised at less expense of labor, and leaves the land in a better state. The flat turnip is the only popular root crop. My own opinion is, that roots are not estimated at their full value. They afford food peculiarly suited to the constitution and habits of neat stock, and promote their health. They serve to make up the variety of food which such animals require; and, by proper arrangements, may be raised more cheaply than corn. If female labor could be used in weeding and thinning them, as in Europe, our farmers would be more willing to raise them.

Market Gardening.

This branch of husbandry, from causes already alluded to, has greatly increased in the towns in the vicinity of the market. It is carried on most largely and most successfully within the distance to which manure can be profitably transported from the city. In the towns within ten miles of a market, the culture of fruit and market vegetables occupies almost the whole attention of the cultivators. From these towns, the produce is carried to market in wagons. Could arrangements be made with the railroads, by which the vegetables could reach the market at a seasonable hour in the morning, the culture of vegetables would be pursued to a much greater extent than it now is in towns at a greater distance. The farmers of Weston, Lincoln, Wayland, Sudbury, Concord, and Acton, and of the towns on the Maine and Lowell Railroads, might then profitably engage in the business. Agents would be necessary in Boston, to convey the produce from the cars to the market. These agents should receive for their services a certain percentage on the sales, which would make it for their interest to obtain the highest prices, and, of course, to keep the articles in the best possible condition. Market vegetables are perishable articles, and must be sent at the proper time, or they will be lost. They must be gathered and carried daily, to have them fresh and saleable.

Rhubarb, asparagus, lettuce, radishes, cucumbers, peas, beans, beets, melons, squashes, green corn, and other esculents, might be raised in large quantities all over the county, were it not for the labor and cost of transportation.

Rhubarb and Asparagus are very profitable crops. The produce of each of these crops has, in some instances, amounted to $1000, per acre, leaving a clear profit of $400, after paying all the expenses of cultivating and marketing. They require a deep, moist soil, and liberal manuring, with careful culture. New varieties of both these plants have been recently introduced, which command the highest prices, from their large size. The Victoria rhubarb and gigantic asparagus are the most popular kinds. Rhubarb stems weighing from one to two pounds are not uncommon. In the vicinity of Lowell are some of the finest gardens in the county. West Cambridge is celebrated for its immense quantities of fine marrow squashes; and Brighton, for its melons. Composts made from the manure of the slaughter-houses and from night-soil, are chiefly depended on in the cultivation of squashes and melons. Large quantities of cabbages are raised in these towns. This is found a profitable crop. Several of the finer varieties of this family are beginning to be cultivated, as the Cauliflower and the Brocoli. They require great care in their cultivation. It is difficult to ripen their seeds. These are commonly imported from Europe. These varieties afford a delicious esculent, and command high prices.

The Borecole or Kale is another variety of the cabbage family, which merits attention. It is distinguished by a large open head, and by curled or wrinkled leaves. It is a hardy plant. It is more valued in the Southern States, where it will live in the ground through the winter, with little or no protection. It should be sown here early in May, and transplanted in July into a rich mellow soil. It requires the same cultivation and after-treatment as other varieties of the cabbage. It may be preserved in the winter by setting the plants in a trench, close together, and bringing the soil up to the lower leaves, and covering the heads with straw or sea-weed, and a roof of boards.

Cauliflower is the most delicately-flavored, and the most peculiar, of all the cabbage family; the flower-buds grow

together, in a firm mass or head, sometimes a foot in diameter. The plants require to be started early in a hotbed; they are most successfully cultivated in cold frames, in a rich fine soil. In this situation they can be protected from the hot sun in the middle of the day, by mats or an awning, and from the frosts of spring and autumn. They require plenty of water, and the soil should be frequently stirred, and kept free from weeds. Late plants may be removed, with the earth upon their roots, to a cellar, and set in trenches, or in boxes filled with earth, and they will mature, and be fit for use in the winter.

It is said there are nearly one thousand varieties of cabbage found in different countries. It is one of the most ancient, and most extensively-cultivated plants. It was a favorite vegetable among the Romans.

The Early Dwarf, the Early York, the Battersea, the Large York, the Sugar Loaf, the Drumhead, the Curled Savoy, the Drumhead Savoy, the Red Dutch, and the Schilling, are the varieties best known in this vicinity. Of these, the Early York, the Curled Savoy, the Sugar Loaf, and the Drumhead, are the most cultivated. The time of sowing must be determined by the time when they are wanted. They require a rich and rather moist soil, and are easily cultivated.

The principal enemies to which they are subject are the cut-worm and the louse, a species of Aphis. The cut-worm, on old grounds, is apt to cut off the plant when it is from two to four inches high. It commits its depredations in the night, and may be usually found, in the early morning, near the root of the plant. Sprinkling with soapsuds, or dusting with powdered lime, are the best means of destroying the lice. From three to four thousand heads are raised on an acre, worth from eight to ten dollars a hundred.

Immense quantities of tomatoes, summer squashes, garden beans, cucumbers, sweet corn, and a great variety of other vegetables, are cultivated for the market. Land suitable for the purpose, and conveniently situated, commands a higher price than for any other department of terraculture. The business requires considerable capital, and a great share of enterprise, skill and activity. The ground must be richly manured, and kept constantly occupied with such crops as may conveniently

follow each other, so that two or three crops in a year may be taken from the same ground, and the culture must be varied to suit the season and the soil. The produce must be gathered with great care, so as not to injure the growing plants, or other crops on the ground, and be promptly sent to market, in good condition. In this business the most careful observation and the most unremitting diligence are the conditions of success.

Agricultural Societies, &c.

There are three Agricultural Societies in the County. The Middlesex, which holds its meetings at Concord, is the oldest County Society in the State. It was incorporated in 1804. The North Middlesex, which meets at Lowell, and the South Middlesex, which has its head-quarters at Framingham, have both been incorporated about five years. These Societies are all doing a good work for the cause of Agriculture.

There are also several efficient Farmers' Clubs, whose members meet weekly in the winter, for the discussion of questions connected with Agriculture. The clubs at Concord, Framingham, Groton, and Chelmsford, are among the oldest and most prominent.

At these meetings, subjects, both of a practical and scientific character, are discussed. Essays, upon subjects assigned, are read. Inquiries are made and answered; and the opinions and experience of the members are communicated. In these ways, much intellectual activity is awakened, which cannot fail to produce its legitimate effect upon the husbandry of the county. I subjoin the following list of subjects discussed, taken from the records of the Concord Farmers' Club: Farm buildings, Rotation of crops, Farm implements, Reclaiming swamp lands, Agricultural books, Diseases of farm stock, New plants for cultivation, Manures, Draining, Root Crops, Garden Fruits, Pasture Lands, Flower Gardening, Preparation of the soil for the seed, Fruit and Ornamental Trees, Influence of the season upon Agriculture, Raising and saving grass crops, Corn crops.

I think no farmers can be found in the state, who, as a class, possess more intelligence, enterprise, and industry, than the

farmers of Middlesex. Still there is room for improvement. Perhaps their attention is directed to too many pursuits, and there is a want of system and method in their farm management. Did they apply their knowledge with more method, and confine their attention more exclusively to their proper business, their energy and perseverance would work out higher results than they now do.

Our farmers have the common Yankee facility for engaging in all kinds of business, and perhaps are too apt to mingle other pursuits with their farming operations. The subjects that especially claim the attention of our farmers at the present time are, a better system of rotation of crops, the reclaiming of more of their low lands, under-draining with tiles, the raising of wheat, the restoration of pasture lands, and better methods of marketing their produce. The plan of marketing now followed is attended with great labor and expense, and takes the farmer away from home at a season when his presence there is especially needed. Perhaps market fairs may supply the proper remedy to some extent. The keeping of more full and exact accounts is also a matter of much importance. It will furnish at the close of each year an accurate knowledge of the results of each operation on the farm, and thus the experience of one year will become a guide for the labors of the next.

Concluding Remarks.

I have now given an outline of the geography and geology of the county, and as accurate a statement as I could obtain of the temperature and amount of rain in its different sections.

With regard to its staple productions, and the methods of culture, I have consulted the most reliable sources of information within my reach, and obtained the opinions of some of the most intelligent men in the county.

There is much diversity in the course of cultivation pursued in different sections, and even in the same towns, so that it is difficult in some instances to say what are the general methods practised. Few farmers keep any record of the course they pursue, or the results they obtain. I am therefore compelled to present the best estimates I can make.

Were farm accounts more generally and more accurately kept, showing the methods of culture, the amount and kind of fertilizers used, the cost of labor, and the amount of crops produced under different circumstances, and the prices obtained, it would be easy to arrive at more satisfactory results than can now be possibly reached by any amount of inquiry. During my investigations, I have been strongly impressed with the importance and value of such records.

I trust, however, that what are stated as facts, will in general be found correct. So far as my own opinions have been expressed, the responsibility must rest upon myself. I believe this is the first attempt to present in a connected view an account of the agriculture of any entire county in the State. I do not propose it as a model for future surveys. The defects, both in its plan and execution, will suggest many improvements. I trust it may stimulate others to effort, and lead to more successful results.

Concord, June 10th, 1859.

Agricultural Education.

By Henry F. French.

The inquiry,—How shall Agricultural Education be advanced in Massachusetts,—seems naturally to resolve itself into three questions: First; Who are to be educated? Secondly; What is to be taught? Thirdly; By what means?

First. Who are to be Educated? We turn naturally to England, the country from which we derive so many of our noblest institutions, and the best cultivated country on earth,—unless, under the authority of Liebig, China is to be excepted,—for light on this subject. But our first inquiry involves a test which indicates that England can give us little aid in our progress in this direction. Her citizens are divided into three clearly marked classes: An aristocracy of wealth and learning and political rank and power; a middle class of farmers,

mechanics, traders, and manufacturers; and a lower class of laborers. So far as agriculture is concerned, these three classes are, the land-owner or landlord; the farmer or tenant; and the laborer. The first class, or *landlord*, owns the land, and receives the rent. The second class, or *farmer*, hires the land, pays the rent, controls and directs the culture, and employs the third class, the *laborer*, who usually works by the day, or by piece-work, at so much an acre for hoeing, reaping, and the like. There are comparatively few land-owners in England, and estates are very large, often comprising many thousands of acres. These are divided into farms, commonly containing each from a hundred to a thousand acres of land, mostly very productive. These large proprietors, who usually reserve extensive domains for their own cultivation and pleasure, employ stewards who collect the rents, superintend the agricultural affairs at home, and keep the accounts.

In England, therefore, we find if we inquire who are to be educated for their parts in agriculture, first, the small class of wealthy landholders, including the nobility, who never mingle on equal terms with the other classes, who have their own schools and colleges and private teachers, and who have no need to ask of the government any assistance in education. We find next, the farmers, an intelligent, active, business-like class of men; and the land-stewards; both of which classes have the actual direction of farm affairs. They live, however, in an old country, where systematic courses of agriculture have been long adopted, and where the same rotation of crops is pursued often for a generation; so that less scope is there found for the exercise of scientific knowledge, or even of judgment and discretion. Indeed, nearly all the progress in agriculture in England is made under the immediate patronage of some lord or wealthy proprietor, whose wealth, or taste, or patriotism, leads him to exert his influence for the introduction of new machinery, processes, crops, or live stock. The tenant-farmer follows as soon as he may with safety, after the experiment has proved successful, and reaps the advantage of it. The laborer, working for a low rate of wages, plods along, a mere servant, doing his task as it has been taught to him in his youth, with

little more occasion for thought than the beasts which he drives. The division of labor is carried to such an extent there, that the ploughman is a ploughman always, from his boyhood to his old age, holding his plough nearly every day of his life; and so it is with other departments of labor. The laborer is poor and ignorant, with little prospect or hope to rise above the humble position into which he was born.

In New England, almost every man is a land-owner and a cultivator of the soil. The farmer owns his farm, and works upon it with his own hands. He combines the three estates: He is nobleman, farmer, and laborer. His land is comparatively new, and requires constant watchfulness and scientific treatment, to develop its resources. He cannot settle into the old ruts of custom, and find satisfactory results. He has not wealth to devote to experiments, and labor is too expensive to be wasted. He is the man both to plan and to execute. The head and the hand, the brain and the muscle, are in him united. This, then, is the class to be benefited by what we may do for agricultural education. There is no such class in England, or in any other country; and in vain shall we look abroad for any system adapted to our wants.

The Census of 1850 gives as the number of free males, over fifteen years of age, engaged in agricultural occupations in this Commonwealth, 55,699; being nineteen per cent., or a little less than one-fifth, of the whole number.

The proportion of such persons throughout the United States engaged in agriculture, is set down at 44.69 per cent; while the proportion in England is but 15 per cent. [De Bow's Compendium of the Census of 1850, p. 128–130.]

Mr. Caird, in his Prairie Farming, says that, "In 1851, only 16 per cent. of the adult population of England was occupied in the business of agriculture. During the previous twenty years, the proportion had fallen from 28 to 10 per cent., from no actual decrease of the numbers employed in agriculture, but from far greater proportional increase of trade. The same gradual change is still going on. At this time (1859) there is probably not more than one-tenth of the adult population of England employed in the culture of the land." [p. 9.]

To give an idea of the vast demand for bread, we may quote the striking statement of the same learned writer. "During the last year," he says, "we have imported into this country (Great Britain) at the rate of nearly one million quarters (8,000,000 bushels) of grain each month. We have thus, in addition to our home crop, consumed EACH DAY the produce of TEN THOUSAND acres of foreign land," [Ib.,] a fact which Mr. Caird states as an inducement to young men, in the old country, to emigrate to this new country of virgin soil and boundless productiveness, to share in the advantages of supplying that demand.

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. In the state of New York, notwithstanding the enormous wealth of the metropolis, the agricultural interest pays *four-fifths* of the taxes.

Prof. J. F. W. Johnston, in his Lectures on Agricultural Chemistry, says, that *nine-tenths* of the fixed capital of all civilized nations is embarked in Agriculture.

Mr. Webster, in his Agricultural Address at Boston, on his return from England, thus stated his impression of the importance of this great interest:

"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—to a great extent it clothes us. Without it, we should not have manufactures; we should not have commerce. They all stand together like pillars in a cluster, the largest in the centre, and that largest is AGRICULTURE."

The class to be educated in New England for agriculture, we have seen, consists not of those who labor merely, but those who own the land, and who direct the cultivation of it. All the broad fields of the State, and all the vast domain of the Union, are in charge for agricultural purposes of the farmer.

But, beside the classes already existing in our country, who have need of agricultural education, it is believed that a want has long been felt, if not often expressed, for another class of men,

which, if it exist at all, is very limited in New England, and which, if recognized among us, might do much for the development of the true agricultural resources of our country.

We believe there is wanted among us a class which shall correspond to the stewards of Old England, of substantial, well-trained farmers, capable of employing the capital of others in agriculture, and of managing, for a salary, farms, for men who have capital to invest, and taste for agricultural pursuits, without the knowledge requisite profitably to direct their farming operations.

Almost every merchant and manufacturer, ship-master and trader, looks anxiously forward to the time when, bidding adieu to the peculiar cares of his own occupation, he may retire with a competence, perhaps to his paternal acres in the interior, perhaps to some elegant suburban residence, and devote his declining years to the peaceful pursuits of agriculture.

The long-expected day arrives, and with "sweet dreams of peace," the rural home is secured. Field is added to field, and costly barns and stables are erected. Extravagant prices are paid for Short-Horns, and Jerseys, and Devons, as caprice or the casual suggestion of friends may dictate. Magnificent operations in draining and subsoiling, in planting orchards and vineyards, are commenced. Guano and phosphates, bone-dust and poudrette, are purchased and applied by the ton, to hasten Nature's tardy operations. Heneries and duck-ponds are constructed, and stocked with fowls of most wonderful names and pedigree. The dairy, with its never-failing spring, with the thousand appliances recommended in the modern treatises, is elaborately furnished. Oxen and horses, ploughs and harrows, carts and harnesses, hay-cutters, root-cutters, mowing-machines, with an endless variety of small tools, all of the most costly description, are added to the working capital, and the bills are cheerfully paid, with the certainty, that by and by the harvests will bring a rich return, and the proprietor will rejoice in his successful experiment in scientific agriculture.

A very few years, however, are sufficient to reverse this pleasing picture. The "hired men" are unfaithful and indolent; the fancy cows break into the cornfields or young clover, and

are ruined; the drains are obstructed by the frosts of the first winter; the apple orchards and the pear orchards and vines yield no fruit; the poultry cannot keep feathers enough to cover their nakedness, and much less can they afford any eggs; the potatoes all rot; the horses fall lame unaccountably; and, to cap the climax of misery, the "kitchen help" goes suddenly off, and "the Angel in the House" either takes refuge in a fit of illness, or "finds relief in tears," with an occasional reminder of "I told you so!"

Scientific farming is pronounced a humbug, and our disappointed but worthy citizen suddenly sells out at a sacrifice, and returns to his city home "a sadder and a wiser man."

Now this is an illustration of cases occurring constantly all around us; and they are a great evil, bringing not only disappointment upon the parties themselves, but discouragement to all who would fain believe that agriculture may be made, at the same time, a rational amusement, and a safe and profitable investment.

If such men as these could understand that agriculture does not "come by Nature," as Dogberry says reading and writing do, and could find a young, well-trained farmer, who understood thoroughly, not only the culture of the farm, but the trading part of his business—the buying and selling of stock and produce—and pay him a fair salary for time and labor, his experiment would prove a success instead of a failure, and his golden dreams of rural life might be realized.

These men fail, because they know nothing of agriculture themselves, and can find no person competent to supply the knowledge in which they themselves are lacking.

Again, there is always capital, seeking safe investment, at a low rate of interest, and there are cheap and fertile lands everywhere in our country, untilled and unoccupied. Surely, in this country, as elsewhere, competent skill can produce from good and cheap land, a fair return for capital invested. If the English farmer can pay five or ten dollars a year rent per acre for his whole farm, and employ a capital of fifty dollars an acre, as he often does, in its cultivation, and make a fair profit in his business, so as to live in independence, it cannot be possible that

with a price merely nominal for the lands, capital cannot be profitably employed in agriculture in this country.

The want here met is the same we have before suggested, of well-educated young men, trained agriculturalists, who may be employed to invest this surplus capital in farming operations. By raising up such a class of men, through schools of agriculture, we may foster the taste which every right-minded man has for rural life; we may open new fields of enterprise to the capitalist, we may develop the true wealth of the country, and at the same time create a new and respectable profession for many of our young men who are now driven from home to seek employment.

In any plan for Agricultural Schools, which may be adopted, arrangements should be made for the fullest participation by female pupils in their advantages. We have progressed, in this Commonwealth, far enough beyond Paganism and Mohammedanism, to appreciate the capacity and the right of woman to the highest intellectual culture. But beyond this, there is the practical view of the question, that no farmer's house in New England is well ordered and comfortable, no farmer's home is tasteful and attractive, and no farmer's farm is profitable, who has not by his side a wife who has such knowledge of agriculture as to give him both aid and sympathy in his business. It were premature to undertake to define the precise course of training best adapted to female education in agriculture. Beside the indoor matters of bread-making, curing meats and the like, the dairy, the poultry-yard, the garden, and indeed most other matters pertaining to a farm establishment, should be well understood by the farmer's wife. The principle being adopted that the schools should receive young women, as well as young men, the proper system of instruction and classification of pupils may be arranged with no great difficulty.

Thus is our first inquiry answered. *They* are to be educated who have in charge as owners, the land itself, who should be "Nature's noblemen"; for, as has been well said by Emerson, "All nobility rests on the possession and use of land"—and they, too, are to be educated who may not, at first, have farms of their own, but desire to combine their knowledge with the capi-

tal of others, that both may be profitably employed in the pursuits of agriculture; and finally they are to be educated who are to be the wives and mothers of the cultivators of the soil, and who may as widows, in their bereavement, be prepared to care for themselves and children, by being capable of conducting advantageously the affairs of the homestead.

Secondly. What is to be Taught?

To this question we may reply, in general terms, that we desire to teach the future farmers of the State how to increase their crops, without impairing the fertility of their soil, and how, at the same time, to cultivate to their fullest capacity their farms, their intellects, and their hearts, not neglecting their physical powers. There are higher aims in life than to raise corn, or to spin cotton, or to make money. A perfect system of education should have regard to the full development of all our powers. The education of the farmer should give him strength of body, vigor and manliness of soul, with refinement and taste to appreciate what is noble, and love what is lovely, as well as skill in the cultivation of his fields, and knowledge of the points of his cattle. To understand clearly what we want, we must first know what we possess, and then, looking abroad for standards of comparison, we may form some estimate of our possible attainments.

Statistics.

A glance at a few statistics will show us what, practically, we are doing in the production of the principal crops, and at the same time indicate whether improvement is demanded and is possible.

We give below, the average product per acre of the leading crops in Massachusetts, and in the whole United States, for the year 1849, as given in the Compendium of the United States Census of 1850, at page 178; also the average product of Massachusetts, for 1855, as given by the Board of Agriculture, in the report of their Secretary.

The correspondence of the two returns for Massachusetts, the one being made under the authority of the United States, and

the other under that of the State, for different years, is such as to confirm the accuracy of both. The difference in the average product of corn in the two returns is but $\frac{3}{13}$ of a bushel, in the product of rye $\frac{8}{14}$ of a bushel, in that of barley but one bushel. The disease of the potato accounts for the discrepancy in the returns of that crop.

We give, also, the average product per acre of the same crops in Scotland, for the year 1856, from returns deemed perfectly reliable, and the average product of three years, at the Albert Model Farm, in Ireland.

Table of Average Products per acre, in Massachusetts, in the United States, in Scotland, and at the Albert Institution, in Ireland. [Corn is not raised in Great Britain.]

	Corn.	Wheat.	Rye.	Barley.	Oats.	Potatoes	Turnips.	Hay.
By Census of 1850, average product in Mass., per acre—bushels, . .	31	16	13	21	26	170		
By Report of Board of Agriculture, 1855, average product in Mass., .	$28\frac{1}{2}$	$15\frac{10}{13}$	$12\frac{6}{14}$	20	$21\frac{1}{3}$	$93\frac{5}{7}$	231	
By Census of 1850, average product in all the United States, as stated in Report of Secretary of State, for 1856, ...	$19\frac{1}{10}$	$9\frac{1}{8}$	$11\frac{4}{5}$	$17\frac{1}{5}$	$19\frac{1}{2}$	$65\frac{3}{4}$		
Average product in all Scotland, 1856, ...	None.	$29\frac{1}{2}$	$24\frac{1}{2}$	$34\frac{1}{4}$	$36\frac{1}{2}$	102	694	
Average product, Albert Institution, Ireland, 1853 to 1855, . . .	—	$32\frac{2}{3}$	—	$39\frac{1}{2}$	70	373	747	

We have here the astonishing facts, that the average product of all the land in Scotland, for the years given, is in wheat, more than *three times* the average of the United States; nearly double that of Massachusetts; and more than double that of some of the great wheat-growing States,—the averages in New York, Ohio, and Indiana, being 12 bushels; in Illinois and Missouri, 11; in

Iowa, 14; in Pennsylvania and Texas, 15; in Virginia, but 5 bushels. The returns for Scotland, in the year 1855, differ but slightly from those for 1850.

It is understood that no full statistics of the agricultural products of England have, in modern times, been taken by the government, so that we must rely upon other than official estimates. We are enabled, however, from returns published in the Mark Lane Express, and from other sources, to form the opinion, that the crops of grain throughout England fall but little short of those of Scotland, while the crops of turnips and mangolds are probably considerably larger in England. There is no doubt, from partial returns, that in England we may find whole counties where the average crop of wheat is nearly or quite double the largest average product per acre of any of the United States except California. From personal examination and inquiry in Lincolnshire, in 1857, the writer is satisfied that even upon Lincoln Heath, not many years ago deemed a worthless tract of land, by judicious cultivation, the average crop of wheat has attained to about thirty bushels to the acre, while on the Fens, which are marshy lands reclaimed from the sea, and not unlike thousands of acres on our seaboard, it is not uncommon to reap fifty bushels of wheat to the acre over large fields. It is stated by a writer in the London Quarterly Review, that in Sussex County, from 40 to 48 bushels of wheat to the acre are produced on some highly cultivated farms, and that successive crops are sometimes taken to prevent the land becoming too rich!

If we look to the Agricultural Transactions of any New England State, we shall find the premium crops of Indian corn to amount usually to nearly 100 bushels of shelled corn to the acre, and often to exceed that quantity. In the Abstract of Returns of the Agricultural Societies of Massachusetts for 1857, we find several statements of crops of wheat of more than thirty, and one instance of thirty-six bushels to the acre.

Comparison of English and French Agriculture.

Lavergne, in his Rural Economy of France and Britain, (1854,) gives an interesting comparison between the productive-

ness of the two countries, with the reasons for the vast superiority of the British over French husbandry.

He shows that in France the average production of wheat is $13\frac{1}{2}$ bushels to the acre, while in England it is 28 bushels, as near as can be ascertained. He says that if we add to this estimate, as to wheat, the maize, buckwheat, and rye of France, and compare the average of the whole four crops with the wheat crop of England, we shall find the production in England more than double in quantity, and in money value three times as much.

Again, he says France, taken as a whole, produces annually $8 per acre, and England proper produces $16. The *animal* produce alone of an English farm is equal at least to the *total* produce of a French farm of equal area, all the vegetable production being additional. By the census of 1841, the total population of the United Kingdom of Great Britain was 27,000,000, and that of France, 34,000,000. Thus, while the former maintained nearly one person on each $2\frac{1}{2}$ acres, France maintained only one on each $3\frac{3}{4}$ acres.

With respect to the average value of land, which is usually estimated by its productiveness, the same author gives for England proper an average value of $160 an acre, while that of France he puts at $80 an acre. And again, he says, taken as a whole, the product of British agriculture was to the product of French agriculture, over an equal surface, as 135 to 100; and, if we compare England *alone* with the whole of France, the former produced at least twice as much as the latter.

These surprising differences, M. Lavergne, himself a Frenchman, and by no means desirous of overstating England's superiority, undertakes to account for. They are not attributable to the soil or climate, for in neither can Great Britain claim any pre-eminence over the continental states. On the contrary, France in both these particulars has confessedly the advantage.

Nor does the disparity between the productiveness of England and France seem to arise, as many have supposed, from the greater variety of French products. "The whole system of English farming may be described as consisting in a large extent of natural or artificial pasture, two roots, the turnip and potato,

two spring cereals, barley and oats, and a winter one, wheat—linked together in a series of crops destined exclusively for the sustenance of animals and of man, or, in other words, for the production of meat, beer, and bread."

To these crops, France adds valuable productions unknown to England, such as the vine, tobacco, the sugar beet, madder, the olive and mulberry, and 2½ millions of acres of gardens and orchards. The sum of these productions amounts in annual value to at least $200,000,000. "These," says Lavergne, "are unquestionable sources of wealth, which partially redeem our inferiority;" and he argues that these productions from land not well suited to grain crops, tend to increase rather than diminish the aggregate of products.

The division of territory into small farms in France is usually regarded as a reason for the inferior productiveness of her soil to that of England. It is true that by the laws of France, children inherit equally the real estate of their parents, while in England it descends to the oldest son; and thus in France the tendency is to constant divisions.

M. Lavergne, however, says that the fact of subdivision in France is usually much exaggerated, and that "there are now in France about 100,000 landed proprietors who pay upwards of $60 direct taxes, and whose fortunes average those of the mass of the English proprietors. Estates of 2,500 to 5,000 acres are frequently to be met with, and territorial fortunes of 5,000 to 20,000 dollars and upwards of *rent* are not altogether unknown."

"It is rash," as the English reviewer remarks, "to affirm by any general proposition that large or small properties promote or restrict the production of agricultural wealth. The result depends altogether on the circumstances of the case. In the county of Sutherland, the Duke's vast estates are far more productive to his tenantry and to himself than if they were subdivided between a few thousand Highland tacksmen; but in the Island of Jersey, where the land is tilled like a garden, the soil is profitably farmed in the smallest possible holdings at enormous rents."

The question returns, Why is English agriculture so much more productive than French agriculture? The author whom we have just quoted, frankly attributes the fact to the *superior cultivation* of Great Britain.

He says this is shown by limiting the wheat crop to the extent of land rendered fit for its production; and that instead of less than half the product of England in cereals, France "ought to obtain more, considering the nature of our soil and climate, both much more favorable to cereals, than the soil and climate of England." "These facts," he adds, "verify this agricultural law, that to reap largely of cereals, it is better to reduce than to extend the breadth of land sown; and that by giving the greatest space to the forage crops, not only is a greater quantity of butcher meat, milk, and wool obtained, but a large production of corn, also."

Two hundred years ago, the agriculture of France was more advanced than that of England; and during the 17th century, France constantly exported corn to that country; but since that period, the current has turned.

Some of the causes suggested for the inferiority of French agriculture are interesting to us, as illustrating a common want in France and America. They result from ignorance of the true principles of agriculture, and persistency in hereditary errors in practice. Let us take, for instance, cattle and sheep husbandry. The French breed sheep chiefly for the wool, while the English have in view also the mutton. The Southdowns of England have, by careful improvement, been perfected so as to give an average weight of 80 to 100 lbs. net of mutton, while the English sheep attain their maturity at one-half the age of the French sheep. The average of French wool, it is said, does not exceed in price that of English wool. "England," says Lavergne, "feeds two sheep per hectare, ($2\frac{1}{2}$ acres,) whilst the average of France is only two-thirds of a head, and the produce of the English sheep being, besides, double that of the French, it follows that the average return of an English sheep-farm is *six times greater* than a French one."

A similar result is obtained as to horned cattle. The French kill many of their calves for veal, and use their oxen for labor,

as we do in New England; while in England, veal is little esteemed for food, and oxen are little used for work. Their bullocks are kept without labor, and killed so soon as they have attained their full weight. M. Lavergne declares that "the working of horned cattle, whether necessary or not, entails a loss, instead of being profitable." The French cattle, he says are slaughtered either too early or too late, but the English at precisely the right time.

This question, as to the profit of working cattle, is worthy of our consideration. At least, there seems good sense as well as feeling in the remark of a Scotchman who tried his hand, for the first time, at ploughing with an ox-team: "Oh," said he, "it breaks my heart to wait for the slow creatures."

On the whole, the superiority of British agriculture is fairly to be attributed,—not to climate, not to soil, not to natural advantages of any kind,—but to the fact that British farmers *understand their business* better than any others, and, knowing their business, are not afraid to embark capital in its prosecution. To be sure, education is not general in England, as in this country; yet more intelligence is brought to bear upon the subject of agriculture. The nobility are a highly educated class, and they hold land in large estates. These are leased to the farmers, who are men of fair education and systematic training in their business. Capital enough,—the more the better, so that it repay a fair interest,—is employed in draining, clearing, and thoroughly working the soil; and so, although the mass of English laborers are ignorant, the agriculture of the country is under the direction of a more intelligent class than even the small farmers of New England, whose average intelligence is so far above that of the laboring classes of England.

The facts which we have stated with reference to the average amount of products in different countries, are sufficient to show to us the *possibilities* of cultivation, and to lead us to consider whether more knowledge might not enable us to bring up our crops from the low averages already named, to something like what we should ourselves consider good crops, and such as are occasionally produced by us. It is not accident—it is not

Providence,—it is rather ignorance and carelessness, that keep our averages so low. We produce small crops partly because we do not understand our business, and partly because we do not act up to the knowledge we possess. By thorough drainage, by systematic rotation, and by careful culture, the English farmer calculates, almost to a certainty, how many bushels of wheat, or oats, or barley, his acres will produce; while in America, for want of knowledge and system and care, our crops seem more the result of accident than cultivation—varying in different seasons, on similar land, often one-half in their amounts.

It is but justice, however, to the occupants of our new and cheap lands at the West, that we should bear in mind, when comparing the average product per acre of their crops with those of Scotland or England, the difference in the value of land and of labor in the old and the new world. In America, land is cheap and labor is dear; while in great Britain, labor is cheap and land is dear. Here the Western pioneer buys his land of the Government, at $1.25 an acre, and enters upon some hundreds of acres, single-handed, to produce his crop. Often his money is borrowed to pay for the land, which is mortgaged for the price. It is not an open question for him, whether his farm shall be cultivated so as to preserve its fertility, or what investment of capital would be most judicious; but the question is, how can I get bread for my children, and how can I make my land pay for itself, so that my creditor shall not take it from me? His true policy is to produce the greatest value of crops for the market, with the least labor; first, to scare the wolf from the door, and at some more convenient season discuss the nice points of husbandry.

To some extent, the same considerations must influence the agriculture of New England. Labor is considerably dearer here than in England, and land much cheaper. It is believed, however, that the superior skill of our countrymen in the invention and use of implements may fully compensate for the greater cost of our manual labor. The price of agricultural products is another element to be considered in estimating the profits of farm operations. So great are the fluctuations of prices on both

sides of the water, that it is difficult to give an estimate that would be permanently reliable. It is believed that agricultural products generally range somewhat higher in England than with us; but it might, perhaps, be fairly estimated that the difference would not nearly pay the difference in the rent, or interest upon the cost, to which the English farmer is subjected.

In this view of the subject, we ought in New England, upon similar land, to be able to employ the same amount of labor per acre, to the same advantage as the English farmer.

But the small average of our crops is really not the worst feature of our agriculture. The depreciation of the soil, by a most exhausting course of cropping, is attracting the attention of all observing men, both at home and abroad. Liebig, in his "Modern Agriculture," refers to this, which he significantly terms the "Spoliation System," thus:—

"The deplorable effects of the spoliation system of farming are nowhere more strikingly evident than in America, where the early colonists found tracts of land which, for many years, by simply ploughing and sowing, yielded a succession of abundant wheat and tobacco harvests. We all know what has become of these fields. In less than two generations, though originally so teeming with fertility, they were turned into deserts, and, in many districts, brought to a state of such absolute exhaustion that even now, after having lain fallow more than a hundred years, they will not yield a remunerative crop of a cereal plant."

Again he says, "The American farmer despoils his field without the least attempt at method in the process. When it ceases to yield him sufficiently abundant crops, he simply quits it, and, with his seeds and plants, betakes himself to a fresh field; for there is plenty of good land to be had in America."

That these are no slanders of foreign writers merely, and that the spoliation system has been applied to the soil of this Commonwealth, let us quote the remarkable language of a Resolution of the Massachusetts Board of Agriculture, found in the Patent-Office Report, for 1852, at page 7.

"*Resolved*, That the necessity of this improvement (agricultural education) is apparent from the Report of the Valuation

Committee to the last Legislature; by which it will be seen that, although there have been added to the lands under improvement since 1840 more than three hundred thousand acres, and although the upland and other mowing lands have been increased more than ninety thousand acres, or nearly fifteen per cent., showing a relative depreciation of twelve per cent.; and, although the tillage lands have been increased more than forty thousand acres in the same period, yet there has been no increase in grain crops, but an absolute depreciation of *six hundred thousand bushels;* and, although the pasturage lands have been increased more than one hundred thousand acres, yet there has been scarcely any augmentation of neat cattle, while in sheep there has been a reduction of more than one hundred and sixty thousand, and in swine of more than seventeen thousand."

"Several years ago," says Mr. Klippart, the accomplished Secretary of the Ohio Board of Agriculture, "I became aware of the fact that wheat, the staple crop of Ohio, was annually diminishing in its yield per acre; that in less than 50 years, the average product was reduced from 30 to less than 15 bushels per acre. I also learned, that in Great Britain the yield had increased from 16 bushels to 36 per acre during the same period."

The working of this spoliation system is very easily understood. Crops of wheat, and oats, and corn, are grown and carried across the sea, or to our home market. Cattle-trains, freighted with the very heart's blood of the soil of the interior lands, and milk-trains, teeming with the phosphates which have not even had opportunity to form the bones of cattle, are rushing daily to our cities, and the product of their final decomposition, instead of being carefully returned to fertilize the soil, is poured through sewers into the rivers or the sea, and lost.

It requires no philosopher, or chemist, or prophet, to tell us that this is systematic destruction, sure but certain suicide; and that RESTITUTION is the watchword for our safety in the future.

Restore to the land more than is taken from it, and its fertility will increase: take from it more than is in some way returned,

and you surely impoverish it. Plants are not formed of newly-created matter, but their substance comes from the earth and from the atmosphere. What the atmosphere supplies is the bountiful gift of Nature to us for our annual use. What the soil supplies to the plant is a loan merely, for the season, to be faithfully repaid in the course of our rotation, not to be sold, or lost, or carried from the farm, unless restored honorably and in full measure from abroad. We have no controversy with those who contend that certain of the mineral constituents of plants may exist in some soils in inexhaustible quantities; but this is the exception, and not the rule.

But though we thus plainly see the effect of this destructive system, it is not easy for a farmer single-handed to apply the proper remedy. Knowledge, and knowledge systematized, which is SCIENCE, and knowledge of such principles diffused among the farmers, which is AGRICULTURAL EDUCATION, is the one thing needful for us now.

What then shall be the scope and extent of the Farmer's Education? Our answer to this question is foreshadowed in what we have previously advanced. We have seen who the farmer is in this country, how numerous his class, how important his position, how defective our system of husbandry, how important that improvement should be made. The standard of the education we would give, therefore, should be as high as possible, and, at the same time, not so high as to shut out any from its advantages. We know that general high culture and scientific training cannot be brought within the reach of all, and that by aiming too high we may lose more than we gain for the common advancement of this great interest. We desire, therefore, to adapt our plans to the present state of society in New England, and to our immediate and pressing wants, and to suggest a course of education by which our agriculturists may best make progress to a better knowledge and a better practice of their art, giving to it a higher dignity and a broader usefulness. The foundation should be a solid one, upon which every day's after-experience and observation can be built. It should furnish, so far as knowledge can furnish it, the means of success to those who enter into agricultural pursuits for a livelihood, leaving it in

their hands to be improved upon, as in every other walk of life where labor forms the chief element.

THIRDLY. WHAT MEANS OF AGRICULTURAL EDUCATION SHOULD NOW BE ADOPTED IN MASSACHUSETTS?

We have thus far endeavored to indicate the class to be educated, showing it to be the most numerous, and entitled to be the controlling class of society; and we have contended that the foundation of the farmer's education should be no less broad and deep than that of the most favored professions.

But our inquiry is, not what would be necessary in a state or country, where no general system of public instruction existed, or what would be expedient in England, where a favored class is highly educated, and the masses are neglected, and where the established system subjects the many as mere manual laborers to the direction of the intelligent few; but what is necessary in this Commonwealth, with her present unexampled system of common schools, and her academies, and scientific schools, and colleges.

A division of our youth, into distinct classes, a separation of those intended for one occupation from those intended for another, is especially, in our republican government, to be deprecated. So long as is possible, let the farmer, the professional man, the mechanic, go along side by side together, in the same schools, with the same studies, in the same classes. All require the same general discipline of the mind, to give them quickness of perception, continuity of thought, tenacity of memory, the use of language, habits of reasoning, power of concentration, the faculty of thinking, and language for the expression of ideas. All require the same physical training, a full and healthy development of the powers of the body; for we are fast becoming convinced by sad examples, that a mind without a body is in this world but little more useful than a body without a mind; and it needs only to be suggested that all require in youth the same moral training.

When we inquire, therefore, what provision shall we make for agricultural education, it is well to have distinctly in mind what provision is already made which is as well fitted for the

education of the farmer as of others, and how far he may go along in our schools and colleges already established, rather than how he may be soonest separated, and set apart for his peculiar occupation.

Especially is it necessary, if we look to other countries for a system of agricultural education, that we should carefully consider, not only their different structure of society, but their particular provisions for general education.

Education in England.

A glance at the statistics of general education in Massachusetts and in England will show us that that country, however successful in practical agriculture, is no model or example for us in education of any kind.

The Report of the Board of Education of this Commonwealth for 1857 shows the whole number of children in the State between 5 and 15 years of age to be 221,478, of whom 154,477, or 70 per cent., attended the public schools on an average in summer and winter, while 203,031, more than 90 per cent., were registered at the same time in attendance. (pp. 6–7.) The same Report estimates the average attendance of pupils of all ages in *private* schools to be 18,935. (p. 47.) If we add the probable proportion of this number who are between the ages of 5 and 15, we shall find that but a small fraction of the children of Massachusetts are destitute of instruction.

Contrast with these facts a statement, which has not probably attracted attention in this country, made by His Royal Highness, Prince Albert, on the subject of education in England and Wales. It was made at "the inauguration of a Conference of the supporters of the education of the working classes" in June, 1857, as reported in the newspapers of the day. He said that the whole number of children in England and Wales was estimated at 4,908,006, and that of these only 2,046,848 attended school at all, whilst 2,861,848 received no instruction whatever, and that "of these two millions of children attending school, only about 600,000 are above the age of nine." So that only about two-fifths of the children of England and Wales attend school at all between 5 and 15 years of age, and only about one-eighth of those between 9 and 15.

We have already seen that agricultural schools and colleges in England must be for the exclusive benefit of the very small class who have some advantages of education; and that any system of teaching that should reach low enough for the apprehension of the laboring classes there, would be at the lowest level of our common schools.

In England, as in this country, the idea seems to be every day becoming more prevalent, that the old established systems of education, while they are well adapted to the preliminary training of students for the professions, are not well adapted to the wants of the largest and most influential portion of society, comprising the merchant, the manufacturer, the civil engineer, the artisan, and last and most important of all, the agriculturist.

Colleges, which were originally in England monastic institutions, in this country have become schools for the education mainly, of young men, to the professions of law and divinity; but to the regular course of college training, we have now added special Schools of Divinity, and Law, and of Medicine, and no young man, in modern days, is thought to be well qualified for the practise of either profession, who has not enjoyed the special training of these schools, in addition to the regular college course.

It is felt and acknowledged everywhere in this country, that the College fits no one for the actual duties of any profession, art, or business of life. It does not profess to do so, but merely to give a training preparatory to the special education for some peculiar business.

For those who have wealth and leisure for the fullest education in literature, in art, and in science, whether they design to devote their lives to some regular profession or business, or to lead lives of elegant leisure, or to take their chances in the mazes of political life, a college course at Cambridge, doubtless offers unsurpassed advantages. But at the best, the number who can avail themselves of the benefits of college life, is but a very small fraction of the young men of the State. The vast majority are compelled to be content with a course of study less expensive of time and of money. This must, from the nature of our republican institutions, continue always to be the case. The

three or four collegiate institutions of the State are all that are demanded for the training of such as are in a position to ask for this peculiar course of instruction. Indeed, the number included in our college classes more than represents the fraction of our own youth who avail themselves of a collegiate course, for other States contribute largely to swell this number. How idle is it, then, to point to our Colleges as the means of the general education of our youth. They do not profess to train their pupils for the actual business of life; and their classes do not in fact, and as at present arranged, never can, include more than a small fraction of our young men.

If, again, we look at our Academies, we shall find in their classes, it is true, a greater number of our youth; for many are able to devote a year or two to an academical course, who have not the means, if they have the inclination, to enter upon a college life. But here, again we meet the same objection, that the academical course of study is not in the line of training for the actual business of life, but rather a system of preparatory training for the colleges. It is understood that the course of studies at our best academies, is especially adapted to prepare young men to enter college, and is not designed as a course complete in itself. The three or four years at the academy are therefore devoted almost exclusively to the study of the dead languages and mathematics.

In the Boston Latin Schools, which are most excellent of their kind, the same course of study, with a view to admission at Cambridge, is prescribed.

Without disparaging in the least, then, the system of instruction adopted in our academies and colleges, for such as have time and means for so thorough a course of preparatory discipline as is afforded by them; without controverting here the propriety of devoting so large a proportion of time to what are termed classical studies,—it seems quite manifest that neither our colleges nor academies are supplying the wants of a large majority of young men, who desire an education for practical life, and especially for agricultural pursuits.

Even in England, where the importance of the education of the masses is by no means appreciated as in this country, the

time-honored Universities of Oxford and Cambridge themselves, have recently admitted that their exclusive course of instruction has not been adapted to the wants of modern times, and have added a new feature to their old system. We refer to what are known in England as

The Middle-Class Examinations.

On the 18th of June, 1857, the University of Oxford passed a statute establishing examinations of those not members of the University—one for youths under 18, another for boys under 15. A Commission was authorized to frame a scheme of examination, appoint examiners, and arrange all the details of the examinations, which are held at various centres, chiefly the large towns. Certificates are given to those under 15 who succeed in the lower examination; and youth under 18 who pass the higher examination, receive the title of *Associate of Arts.*

The University of Cambridge, in England, has followed the example of Oxford, and provided for similar examinations.

The objects of these examinations are, to encourage the middle classes in the pursuit of learning, to guide them in their course of study, and finally to test their progress, and grant them such certificates of ability as shall give them the positions in business life for which they are found qualified.

It was perceived in England, as here, that no adequate education was provided for business life. Of 200 boys in a grammar school in Leeds, only three on an average go yearly to the Universities. The others go directly from the grammar school to such business as they can find. Under the new arrangement, it is hoped that young men designing to engage in trade, in art, in science, in manufactures, or in agriculture, may be encouraged to pursue their studies in the course indicated by the Universities, in order to avail themselves of the certificates or titles thus publicly conferred.

We have thus noticed this new movement of the old Universities of England, that we may avail ourselves of the conclusive weight of their authority to sustain our position, that the course of education at our academies and colleges does not meet the present demands of society in New England.

If it were possible, as it is not, that all the youth of our Commonwealth should participate in the advantages of a college course, we should still contend that to fit them for agricultural life, as practical farmers, other training, other institutions, are necessary. As it is impossible that any large proportion of them can ever devote so much of their time to education merely preparatory to the special training for their particular business, it is still more necessary that the time which they can devote to their education should be spent in the enjoyment of instruction best adapted on the whole to develop their characters as men and as citizens, and give them success in life.

Various attempts have been made in England to establish agricultural schools for the benefit of the middle classes; but thus far with little prospect of success.

The Agricultural College at Cirencester, about 95 miles northwest of London, seems to have been founded with a view to the education of the middle class, and to have been started with every advantage for success. A farm of 700 acres is attached to it, and professorships are established, with a three-years' course of study well adapted to fit pupils for the care of large estates or small farms. A particular statement of its character and course of instruction may be found in Dr. Hitchcock's Report.

"How far it has answered," remarks an English writer, "for the more immediate object of its establishment, the education of the sons of farmers, is best answered by the fact that, (in 1849) out of 70 pupils, there was not one to be found at the institution."

"Formerly," says Dr. Hitchcock, "the school was open for the sons of the smaller farmers, but could not find support on that plan; and it was found, if these attended, the wealthier classes would not send their sons! The price, accordingly, has been raised, and none but the sons of gentlemen, such as clergymen and wealthy laymen, now attend. None of the nobility send their children, although many give their money for its support." And this is perhaps as successful as any experiment, in England proper, in establishing an agricultural school.

It is hardly worth our while to look to a country where the "small farmers," the "gentlemen," and the "nobility," form three classes so distinct that their children cannot attend the same agricultural college, for models for our republican country.

In nearly every country in Europe, there are agricultural schools or colleges, established mostly by Government, an interesting account of which is contained in the elaborate and interesting Report of Dr. Hitchcock, who enumerates no less than 352 of such institutions.

Although much may be learned by a careful study of the different systems adopted, yet our conclusion must be that this country, and especially this State, is in a condition as to general education, to require institutions for the advancement of agricultural education essentially different from those that are found in any foreign country.

The Report of the Commissioners concerning Agricultural Schools made to the Legislature in 1851, of which Dr. Hitchcock's Report forms a part, is a most valuable contribution to our stock of agricultural knowledge. Its most important recommendations were the establishment of "a State Department of Agriculture," and "a Central Agricultural College, with a Model and Experimental Farm," to be supported partly by the State, and partly by private contribution. In accordance with these recommendations, the Board of Agriculture was immediately established; but no very successful steps have yet been taken towards the foundation of an agricultural college.

It is believed, indeed, that as the foreign institutions first introduced to general notice by Dr. Hitchcock's Report, have been more and more examined, and the condition of general education in this State has been better appreciated, and its standard raised yearly higher and higher, it has become doubtful at least whether it is expedient to establish any magnificent institution for agricultural instruction alone.

If the object were to provide for those who are in a position to devote their lives to agriculture as a science merely, what better course could be devised than that they pursue for their intellectual training, the system of education provided in our schools and colleges? Thus far they may go side by side with

those designed for the learned professions, and thus may they lay their foundations deep and broad for the structure peculiar to their intended pursuits.

But it is manifest, as we have said, that the number who can thus devote their lives to science is very small. Long before the end of a college course, most of those who are to be devoted to agricultural life must begin to labor with their hands. A life of severe study cannot be the farmer's life. There is no man living, acknowledged to be a scientific and practical chemist, who has for years performed his regular day's work upon the farm. Such a science demands all the powers, all the life, of a trained and accomplished scholar.

It is very doubtful whether agriculture at present offers such inducements to educated men in this country, as to retain in its ranks, as a business, men who have invested in their education so much capital. Their very capacity for usefulness in other positions tempts them away from the farm.

It is very doubtful, too, whether an agricultural college, however well endowed, could attract to itself a sufficient number of pupils to fill its classes. How much time would be required, how much money necessary, to establish an agricultural college, which should stand in equal rank with Harvard University, is left to others to estimate. And if such a college were now in operation, it is manifest how small a proportion of our young men could share in its advantages. The experiments attempted in this country of State agricultural colleges, give no such indications of success as to encourage new enterprises for the present. We shall give in another place, some account of the progress and prospects of the most prominent among them.

Finding society thus necessarily divided into men of science and letters, and men of business, and that in the mysteries of agriculture, the priests who minister at the altar must always be few, while they who participate in her practical knowledge are many, is it not wise to inquire how we shall best serve the many, seeing that the few who can devote themselves to science have already ample opportunities for culture. Let the learned few still pursue their quiet studies, announcing their results from time to time to the world, to be tested by practical experiment;

let lecturers go through the State with such teachings as may be best inculcated by their method; let the Board of Agriculture, and societies for the promotion of agriculture, disseminate useful facts and theories by reports and essays, and by meetings for discussion; let exhibitions, and fairs, and market-days, continue to assemble the farmers for their various purposes; and then let us inquire whether anything more can reasonably be done for the education of the farmer? We believe that the time has come when one more agency should be systematically set in operation in this State, namely:

Schools of Agriculture.

There is much that can never be learned from books or oral teaching. No man can learn how to be a horseman, or swimmer, or skater, in any other way but by practice. So it is with all that belongs to the practice of the *art* of agriculture. To be able to direct others with authority, the farmer should have skill in all the manual processes of farming, to hold the plough or to drive, to use the scythe, the axe, and the hoe. There are a thousand things to be learned by the farmer in every department of his business, which can be learned only by actual observation on the farm, and which may be suggested in considering the plan of such an institution as we recommend. It may be premised, in the outset, that an Experimental Farm makes a part of almost every system of agricultural instruction that has ever been adopted in the old world, or projected in the new.

Dr. Hitchcock says, in his Report: "With a very few exceptions,—I do not recollect any save the University of Edinburgh, —a farm, or at least a few acres of land, is connected with the school."

A school of agriculture with an experimental farm, we propose as the one thing especially needful in our present condition, to be established as soon as practicable in each county.

We should abandon, for the present, the idea of a splendid university, where everything, including the dead languages and abstruse mathematics are to be taught.

The existing institutions of learning are sufficient for Latin and Greek, and mathematics in general, and the common schools,

with perhaps some modifications with reference to preparation for schools peculiarly agricultural, are laying the requisite foundation for more advanced education. While we admit the utility of lectures and of farmers' clubs in the dissemination of knowledge among those who are already farmers, and therefore full-grown men, we conceive that they furnish no substitute for schools for the training of boys and youth.

Lectures upon science or art may amuse a general audience; but only they who have prepared their minds by previous training, can profit much by knowledge in so condensed a form. Farmers, as we now find them, even in Massachusetts, have not had the discipline to enable them to apprehend by a mere statement, the principles of chemistry, of geology, of physiology, or even the processes of subsoiling, drainage, and the like, which may be made very easy to a lad of eighteen, by a regular course of instruction. In agriculture, as in other studies, we must educate in youth; and farmers' clubs, however useful, must be composed chiefly of men, and their utility must be limited rather to the diffusion of the knowledge of facts than of principles. Both lectures and farmers' clubs are modes of *instruction* rather than of *education*, if we may take the distinction indicated by the derivation of the words, methods of pouring out knowledge upon those not well prepared for its reception, rather than of deducing it from principles which are fixed landmarks in the mind.

We see no agency yet in operation which can reach the class whom we have in view. Our aim is to meet the present want of the community, to give aid to a numerous existing class of young men, who desire more knowledge of their business of agriculture, and know not how to obtain it. There are two obstacles in the way of grand agricultural colleges, which have been met, it is believed, in every attempt at their establishment thus far in this country. First, the want of competent teachers. Secondly, the want of pupils. There are few scholars with special qualifications to take charge of agricultural professorships, and few young men ready to devote their lives to a long and expensive course of study looking exclusively to agricultural life.

There are many young men, of good general education, who wish to learn thoroughly the art, with enough of the science of agriculture, to conduct their operations with profit, who have now no means of advancement in the knowledge of their peculiar business. How can we teach them the best methods of managing their farms? The true answer is, by showing them the best methods of cultivation, and teaching them to perform with their own hands the processes connected with them—by making them thoroughly acquainted with the best farm implements, the best farm buildings, the different breeds of live stock and their various qualities, by teaching them system and habits of careful observation, and by making them understand the *reasons* of things, or the *principles and science of husbandry.*

We proceed to suggest a general plan for such an institution, with the hope that it may form a ground-work on which others may rear a more finished structure.

Land and Location.

Two to five hundred acres of cheap land, the more diversified the better, of wood, pasture, swamps, hills and valleys, capable of improvement, and abundantly watered, and with water-power if practicable.

A location as central in the county as may be convenient, and, if possible, near a sufficient market for milk and vegetables; because that would allow of a more various culture.

Buildings, Apparatus, Stock, and Tools.

1. A building with lecture and recitation rooms, library, Natural History, and model rooms, and a chemical laboratory when found necessary; to accommodate 100 students, with a plan capable of being conveniently enlarged, when we see how well the experiment succeeds.

2. A *dwelling-house,* to be occupied by the Principal and his family, and such proportion of the pupils as it may be thought best to board. Whether it may be best to require residence on the premises, wholly or in part, may depend on the proximity of convenient dwellings for boarders.

3. A *model barn*, to be constructed and fitted up for all the various uses of a farmer's barn, in the most perfect manner.

4. A granary, tool-house, and offices.

5. The *live stock* must depend on the location, and leading branches of husbandry adopted; but it should be, in part, of thorough-bred animals, so that the farm should exhibit specimens of all improved breeds, as far as practicable.

6. The *farm implements* should be of the very best kinds in use.

7. The *library* and *apparatus* must of course be gradually collected. How much is essential to the commencement of the school must depend somewhat on the proximity of scientific institutions. The best agricultural journals of the world should be furnished. Collections of models of agricultural implements, of dried grains, seeds, grasses, the various kinds of wood, models of the varieties of fruits, and in general as complete a museum of Natural History as is possible, and such chemical and philosophical apparatus as may be deemed necessary.

Teachers, and Course of Study.

1. A *Principal*, who should be a thorough practical farmer, and at the same time a believer in Science and Progress, and who has character, tact and judgment, to be the responsible head of the institution. He should have the general charge, under the direction of the State Board of Agriculture, of all the affairs of the farm and school.

2. *Assistants*, or *Professors*, whose duties should be chiefly those of teachers, and who should be the regular instructors of the classes, to be assisted by occasional or regular courses of lectures from scientific men not connected with the school.

The course of study should be systematic, occupying perhaps two to three years. A review of the general English studies taught in our high schools might probably be necessary, to some extent, to place the scholars on a uniform basis. The leading feature, however, should be instruction in scientific and practical agriculture, and this involves Chemistry, Natural Philosophy, Veterinary Medicine and Surgery, &c.

The *mathematics of agriculture*, such as farm-accounts, surveying, levelling, draining, constructing roads and bridges, the uses and forces of water, steam, &c., would of course be prominent studies.

The dead languages and higher mathematics should not form part of the course, nor should a knowledge of them be requisite for admission.

Pupils.

No pupil should be received under 16 years of age, nor for less than the prescribed term. Perhaps a division of the pupils might be made, allowing those who desired it, to pursue a course of selected studies, to be completed in one year, while the full course should require two or more years.

Pupils should be admitted, on examination by a Board independent of the teachers, only at a stated period. They would pay tuition fees, and for their board. They should be *required* to labor on the farm, daily, in all kinds of farm work, and the labor should be so apportioned that each should take his turn in every department of labor. Any student who should labor more than the time prescribed, should be liberally credited for the excess towards the expenses of his course.

These are the general features which seem best adapted to the wants and the views of the public. We have purposely avoided going into details, preferring to leave them for more careful consideration. The very full and valuable Report of Dr. Hitchcock is again referred to for the various plans of agricultural schools in operation in Europe, from which much may be learned, of value to us.

The Plan for Agricultural Education recommended by Dr. Hitchcock, at page 78 of his Report, is deserving of the highest respect and consideration. It has been deemed by many, however, to involve too great an expenditure for a first experiment, and it is believed that a plan less ambitious and more simple might be expedient for the present. Whatever the plan adopted, let it be adopted with a view to Progress. Let it be so constructed that, however simple and limited its operations at first, it may keep pace with the demands of the public. Let it be a complete

success, in whatever it may propose, and rather exceed than fall short of its promises. In this branch of education, as in all others, it is necessary to begin at the bottom and work upward; to strike one before we strike twelve; to educate boys before we educate men; and so to have schools before we have colleges.

How Established.

The funds necessary to one experiment might be appropriated in part by the State; the school to be located in such county as should furnish the largest amount, by subscription or otherwise, for the object.

We should recommend that the institution be not connected with any existing college or academy, which will be sure to overshadow it, nor with any pauper or reform establishment, which must tend to degrade it in public esteem.

The leading idea is to establish a school of agriculture, not for general intellectual training, but specially for agricultural education—high enough in this department to complete the education as agriculturists, of graduates of our colleges, yet not so high in its requirements for admission that good scholars of our public schools may not participate in its advantages,—and an experimental farm, as an aid to the school in the instruction of its pupils, and as a public example.

Such an institution should be established as educational, not as a profitable investment of money. A farm school, like any other school, must be expensive, and not self-supporting. A model farm, conducted only with a view to profit, might be made to pay good dividends; but a farm conducted chiefly as experimental, and so as best to illustrate the various principles and processes of agriculture, and not with a view to a market, could not be self-supporting.

In the plan suggested, the writer has had in mind, The Albert Agricultural Training Institution, near Dublin, Ireland, which he visited in 1857, and for whose Reports, with other valuable information, he is indebted to Dr. Kirkpatrick, its able and successful Superintendent, who is also head Inspector of all the Agricultural Schools in Ireland.

The Commissioners of National Education have established, in Ireland, an admirable system, consisting of four classes of agricultural schools, under the names of Model Schools, Ordinary Schools, School Gardens, and Workhouse Schools; the number of which existing at the close of the year 1857 was, Model, 38; Ordinary, 48; School Gardens, 3; Workhouse, 76;—making a total of 165.

We give below, part of the Prospectus of the Albert Institution, not as a model for agricultural schools in this country, because the state of general education, the structure of society, and the demands for educated labor, are all widely different in the two countries, but because it is convenient to have before us some complete plans of agricultural institutions, from which we may select such features as shall be deemed suited to our wants.

The principal object of this institution is the training of teachers for other schools.

As a model farm, this can probably bear favorable comparison in point of good husbandry with any other in the world. At a preceding page (232) is given the average product of its principal crops.

To these it may be added, as an illustration of successful experiments there, that, in 1857, by means of irrigation with liquid manure, there were produced on this farm 38 tons, 7 cwt. (2,240 lbs. to the ton) of Italian rye-grass per acre. It was cut at five cuttings, and of course weighed green, being used for soiling.

PROSPECTUS

OF THE

Albert National Agricultural Training Institution,

GLASNEVIN, DUBLIN.

OBJECTS.

This Institution, which was established by the Commissioners of National Education in Ireland, in the year 1838, is designed to supply such instruction, both in the *science* and *practice* of Agriculture, as will qualify young men for discharging the important duties of Agricultural Teachers, Land Stewards, Farmers, &c., &c.

THE FARM.

The farm, which is situated about three miles north of Dublin, and lies between the public roads leading to Santry and Swords, contains 180 statute acres. With a view of exemplifying the most approved systems of culture, various rotations of cropping are followed upon separate divisions of the farm. The system of House-feeding Cattle is pursued both Summer and Winter. The arrangements for affording to the pupils as large an amount of information as possible upon every branch of the business of farming, including Dairy Husbandry, the Fattening of Cattle, the Breeding and Rearing of different kinds of Live Stock, the various operations of field culture, and the permanent improvement of the soil, are such as to place within their reach an opportunity of becoming acquainted with the practical details of every department of agriculture.

THE TRAINING INSTITUTION.

The Training Institution is situated on the farm. The new buildings (which were completed in 1853) comprise Dormitories, Dining Hall, Lecture and School-Room for seventy-five resident pupils; Museum, Library, and Laboratory; a comprehensive range of farm-offices, and apartments for the Superintendent, Matron, Land Steward, Second Literary Teacher, and Servants.

MANAGEMENT.

The chief supervision of the Institution devolves upon the Superintendent. The Agriculturist who resides on the farm carries out the practical working of the farm under the direction of the Superintendent. The Literary instruction of the pupils is conducted by two competent teachers; and a Gardener of practical experience has charge of the Horticultural department.

INSTRUCTION.

The course of instruction imparted by the Literary teachers embraces all the branches which constitute a sound English Education; namely, English Grammar and Composition, Arithmetic, Book-keeping, and Mathematics, including Land Surveying, Levelling, and Mapping.

Each of the Lecturers of the Institution delivers two sessional courses of lectures, annually. By these lectures, which are illustrated by means of numerous and carefully executed diagrams, valuable collections of minerals, plants, &c., and chemical apparatus, an opportunity is afforded the pupils to acquire a thorough knowledge of their profession.

In order that the pupils may become fully acquainted with improved practical husbandry, they are called upon to take part in the performance of every farm operation—the feeding and management of live stock, &c. They are made practically acquainted with the most recent application of steam power to agricultural purposes, and also with the uses of a very select collection of farm implements.

A Certificate, founded on the reports of the Lecturers and Officers, will be granted to each pupil by the Superintendent, at the termination of his period of training, provided his conduct and proficiency warrant it.

ADMISSION.

Two classes are admitted to the Institution :—

I.—The first or Intern Class consists of two divisions, one of which is composed of young men who intend to become Land Stewards or Farmers, and who are boarded, lodged, and educated at the public expense.

A pupil is admitted into this division by application to the Secretaries, on the following conditions, viz. :

1. That he has acquired such literary attainments at a National School as will enable him to pass a satisfactory examination in the subjects specified in the Programme.

2. That he has attained the age of seventeen years, is of sound constitution, and free from disease.

3. That he produce satisfactory certificates of character, as regards his *industrial* habits, *sobriety*, and *general morality*.

The period of training is two years.

The second division of this Class consists of Literary Teachers who are qualifying themselves for conducting agricultural schools.

The members of this division are also boarded, &c., gratuitously, and are admitted on the following conditions :

That they have been previously trained in the Literary Department; and are able to produce similar satisfactory testimonials of character, &c., to those required on the part of the first division.

The period of training in this division extends to one year only.

II.—The second or Extern Class is composed of young men who board and lodge at their own expense, in the immediate neighborhood of the Farm.

The members of this Class are admitted upon the following terms:

1. That they engage in the ordinary farm work.

2. That they attend punctually, with the Intern pupils, all the lectures delivered at the Institution.

3. That they be amenable to all its rules and regulations.

4. That each pay an entrance fee of two guineas, which is appropriated to the purchase of Agricultural Books for the Library of the Institution.

No specified time is set apart for the training of "Pupils" of this Class.

GENERAL RULES AND REGULATIONS

TO BE OBSERVED BY THE PUPILS.

1. To pay prompt obedience to the orders of all the officers.

2. To attend punctually to all duties laid down in "Time Table;" and to make no unnecessary noise within the building.

3. To appear in becoming apparel, and to cultivate habits of cleanliness and neatness. To wear slippers always within doors, and "school" coats when at study, and never to wear them out of doors.

4. Smoking and the use of spirituous liquors are strictly prohibited.

5. Not to suffer any garment, book, implement, or other article, to lie about in a slovenly or irregular manner.

6. The expense of repairing or replacing any article belonging to the Institution, injured or mislaid through the carelessness of any pupil, must be borne by him.

7. To observe a respectful, kind, and gentle demeanor in their intercourse with each other.

8. Not to enter the culinary department without permission. Undue intercourse with parties in the neighborhood is not allowed; and intimacy with the servants of the Institution is prohibited.

9. It is not permitted to become a member of any political society, nor to take part at any meeting of a sectarian character. Newspapers, books, and periodicals, of a political or polemical character, are prohibited; also discussions on these subjects.

10. Neglect of attendance at Divine Worship on Sunday, and other days set apart for religious duty, will be looked on as a serious offence; and pupils are expected to pay strict attention to their respective clergymen, and otherwise attend to their religious duties.

11. No pupil is to wear or injure any article the property of another.

12. Nor to leave the premises on any occasion without permission.

13. *Out-Door Labor.*—Both Classes are to engage in all descriptions of farm labor; to exhibit anxiety and zeal in performing the same; to take due care of implements, &c., and are liable to be called on for extra work at any busy season of the year.

14. *Yard Officers*—are appointed in their turn to feed, clean, and otherwise attend to the Live Stock, and to keep the Farm Yard and Offices clean and neat. They are to be assisted by the entire class each morning and night, Sundays and Holidays excepted.

15. *Stable.*—Each pupil is called upon in his turn to take charge of a horse, which he is to clean and litter, under the direction of the ploughman.

PROGRAMME OF ENTRANCE EXAMINATION.

Reading.—To read with correctness any passage selected in the Fourth Book of Lessons.

Writing.—To write a legible hand with facility.

Spelling.—To write from dictation with correctness any passage selected from the Third Book of Lessons.

Grammar.—To know the parts of Speech, and to possess such an elementary knowledge of Syntax as to be able to parse short and easy sentences in prose.

Geography.—To be able to define the technical terms of Geography, and to know the general outlines of the Map of the World, and the Boundaries, Counties, Chief Towns, Rivers, &c., of Ireland.

Arithmetic.—To be able to repeat with accuracy, or write out the several Arithmetical Tables, and to work with facility and accuracy any questions in the elementary rules, simple proportion, and practice, and to possess an acquaintance with the nature of Fractions.

Book-keeping.—To be acquainted with the nature and use of a Cash Account.

Geometry.—To know at least the First Book of Euclid.

GENERAL TIME TABLE OF THE ALBERT INSTITUTION.

The entire Class is divided into two divisions, A and B.

SUMMER HALF-YEAR.

Time.	Employment of Class A, during one day.	Employment of Class B, during the same day.
H. M.		
At 5 0 A. M.	Rise.	Same as Class A.
From 5 0 to 5 30	Dress; Devotional Exercises.	" "
5 30 " 6 0	Feed and clean Stock, work in Yard and on Farm.	" "
6 0 " 6 30	Wash, dress, and prepare for Study.	" "
6 30 " 8 0	Study in School-room.	" "
8 0 " 9 0	Attend Lecture.	" "
9 0 " 9 30	Breakfast.	" "
9 30 " 10 0	Prepare for Study.	Prepare for Work.
10 0 " 2 0 P.M.	Literary Instruction.	Work on Farm.
P.M. 2 0 " 3 0	Dinner.	Same as Class A.
3 0 " 6 0	Work on Farm.	" "
6 0 " 6 30	Prepare for Study.	" "
6 30 " 8 30	Study in School-room.	" "
8 30 " 9 0	Supper.	" "
9 0 " 9 30	Feed and clean Stock.	" "
9 30 " 10 15	Enter Dormitories; Devotional Exercises; prepare for bed.	" "
10 15 . . .	Lights extinguished in Dormitories.	" "

N. B.—In Winter the pupils rise at six o'clock, and work till twilight.

Existing Agricultural Colleges in the United States.

It is difficult to ascertain, and somewhat hazardous to undertake to state, the condition and prospects for usefulness of the agricultural institutions in this country. They are most of them new, and have had no time for fair experiment. Allusion is made to them rather to show that as yet they furnish no strong evidence that success will attend expensive and magnificent enterprises of this kind, although it would yet be quite premature to pronounce any of them failures.

So much has been said and written of the various agricultural colleges, that it seems proper to attempt some sketch of the position of those which seem most prominent.

New York State Agricultural College.

The Charter was granted in April, 1853. By the death of Mr. John Delafield, the leading spirit of the enterprise, all efforts seem to have been suspended till 1855, when a subscription of more than $40,000 having been raised, mostly in the town of Ovid and vicinity, for a college to be located at that place, an Act of the Legislature was procured for a loan of $40,000 for 21 years, without interest, in aid of the institution.

The trustees have located the institution at Ovid, on the east side of Seneca Lake, and have purchased in all about 700 acres of land for its purposes, comprising a great variety of soil. The buildings *to be* erected are intended to accommodate 350 students. Candidates for admission must be sixteen years of age, and must be able to read and write the English language well, and be well versed in grammar and arithmetic. Although not intended as a manual labor school, it is proposed to require the students to spend so much time in the field as may be necessary to apply the theory to the practice of husbandry. The course of study as proposed, which is to occupy three years, does not include any language but the English. It is expected that the institution may be opened in the spring of 1860.

The People's College.

This Institution, located near Havana, New York, was chartered in April, 1853. A good farm of 250 acres has been purchased, and a noble college edifice, of stone and brick, 216 feet long, four stories high, has been more than two years in process of erection. The college buildings will cost, it is estimated, nearly $200,000 when completed.

Among the eighteen professorships to be established, we notice one of Natural and Revealed Theology, one of Ancient and Modern History, and one of the Latin and Greek Languages.

It is manifest that the People's College, so far from being an agricultural college exclusively, merely recognizes agriculture among the departments of Useful Industry, and annexes a farm to its apparatus. An objection to it, as an agricultural institution, is that the agricultural department would probably soon become subordinate to the literary department, which seems to be its principal object.

The Farmers' High School, of Pennsylvania.
(At Farm School, Centre Co.)

This School was opened on the 16th of February, 1859. Its first catalogue gives the names of 119 students. The object of the institution is stated to be "to afford a system of instruction as extensive and as thorough as that of the usual course of our best colleges, but to differ from the latter, in devoting no time to the study of the ancient languages," and to adopt a system of instruction which shall embrace those studies bearing upon agriculture. Manual labor, combined with study during the course, is a prominent feature in this school.

A farm of 400 acres has been procured; and a college building, 234 feet in length, is in progress, but unfinished.

The course of study prescribed is to occupy four years, and includes most of the English branches taught in our colleges.

Existing schools in Massachusetts, we believe, already provide for the greater part of the instruction indicated in the course of studies here prescribed, and we therefore do not recognize in this institution, the model for a School of Agriculture in Massachusetts.

Agricultural College of the State of Michigan.

This College was established in obedience to a requisition of the Revised Constitution of the State. A tract of about 676 acres of land, about 3½ miles east of Lansing, nearly in a state of nature, was purchased in 1855. The course of study seems not to get definitively fixed, but it will probably embrace four years. The Languages will not be included in the course of instruction. The act of organization requires that tuition to the citizens of the State shall be free,—a provision which seems very liberal, but has already been found very troublesome.

From a volume entitled, "School Laws of Michigan," &c., published in 1859, by authority of the Superintendent of Public Instruction, we learn that the college was opened, with sixty-one students, on the 13th of May, 1857. The second term commenced in December of the same year, with one hundred students. The third term commenced in April, 1858, with no increase of numbers, for the reason that the buildings were already crowded to their utmost capacity. "Had the accommodations been sufficient for all who made application for admission, the number of students at the third term would have been not less than two hundred."

"Thus," says the Report, "the institution was put in operation; a large college building, four professors' houses, a boarding-house, a brick barn and outhouses, were erected; one of the best laboratories in the country purchased; nearly 200 acres of land cleared, and brought under cultivation; an orchard planted, and the farm stocked with horses and cattle; and the school conducted one year, at an expense, including the cost of the magnificent farm, of $97,526.63."

The Report states, that the actual wants of the college required at least $10,000 more than has been provided, to carry it to the spring of 1859 without embarrassment. It is claimed that the enterprise is successful. "It *was*, in 1855, in most of its features, an experiment. It *is*, in 1858, no longer so. It had then no precedents upon which to rely. It has now furnished successful precedents, which several other States are already taking measures to follow."

The Report indicates clearly that students, far beyond the number that can be accommodated, are desirous of admission, and suggests that $50,000 would be necessary to make such improvements as might be fully occupied as soon as completed.

As to the question, "How shall the college be sustained?" there is evident embarrassment. "The agricultural college has no endowment. Until it has, its current expenses must be a charge upon the treasury, if tuition is to remain free. * * * The State has no more lands from which to create an endowment for this or any other institution." The Report closes with an appeal to Congress for an appropriation of lands, for the support of agricultural colleges in all the States!

From a private source, we learn that affairs have not gone pleasantly or profitably with the Michigan College, and that it is in imminent danger of failure.

The following extract, from the Report of the Superintendent of Public Instruction, under date of November 17th, 1859, gives ominous indication that this most prominent experiment of agricultural colleges in America is not yet to be pronounced a success.

"It is easy to predict, that unless some radical change occurred in the character of the institution, it must prove, sooner or later, a pitiful failure. If it is to remain a mere academic school, as it now is, with the costly advantages of a State farm attached, to furnish facilities for manual labor, and which parents seek as they seek any other high school, as a place where they may cheaply and conveniently educate their sons, the people of the State will repudiate it as a useless burden on the finances, and a mere mockery of their purposes and hopes, and some future legislature will listen more favorably than the last to the proposition to sell it out at public auction.

"Already a secret, or but half-expressed feeling of painful disappointment, lurks in the hearts of its early friends and founders—a feeling that may easily ripen into open hostility, should this Board fail in its obvious duty to carry out the true intent of the law."

The Maryland Agricultural College.

In 1856, the Legislature of Maryland passed an act appropriating $6,000 per annum for the perpetual support of an agricultural college, on condition that $50,000 should be raised by private subscription. The farm of Mr. Calvert, comprising 428 acres, was purchased in 1857. From a private source, we learn that the college was opened in October of that year, with 40 pupils. No course of study is yet announced, but enough is said in their circular to show that this is not strictly an *agricultural* institution. Indeed we cannot expect to find, in a slave State, any educational establishment adapted to the wants of New England, with her common-school system.

The plan embraces not only instruction in agriculture, but receiving boys of twelve years old and upwards, it proposes a complete training in all the usual departments of learning, embracing the study of languages, spoken and unspoken; thus forming a sort of University, with an experimental farm attached.

Virginia Military Institute.

Although the name of this institution indicates anything rather than education for the peaceful pursuits of agriculture, yet we learn that it is designed rather as a polytechnic school, to fit young men for the practical duties of life, than as an exclusively military school.

From a valuable report of Major Gilham, of January 8, 1859, we gather the general plan for the agricultural department of this institution. It seems well adapted to the wants of a State in which there exists no general system of common-school education, and where slave labor is chiefly relied upon.

In such a State, as in England, the land owner and the laborer form entirely distinct classes. Education is for the higher class, and they are to direct the classes below them.

"The young men of the South, who would seek the benefits of an agricultural education," says Major Gilham, "belong for the most part to that class who *have means*." * * * "Our first efforts, therefore, should be to establish such schools as

would be required for the education of the proprietors of the landed estates of the country." * * * "Our agricultural system is peculiar, and must be so, as it is modified, in very many of its details, by the institution of domestic slavery. All, or nearly all farm labor is performed by the slave."

"The economy and management of slave labor," and "the laws relating to the owning and hiring of slaves," are set down as subjects to be embraced in the course of study. The agricultural course given by Major Gilham requires four years, and includes Mathematics, Geography, English Grammar, French, Latin, &c., and nothing peculiar to agriculture appears till the fourth year, when the "science and practice of agriculture" has a prominent place.

We find here, what we have seen in all the plans of agricultural schools in Europe, a necessity for preparing the student for entering upon studies peculiarly agricultural. The general mass of the people being uneducated, or education if general, not being systematized, no young men can be found who can, without long training in the same classes, be formed into schools for agriculture merely. The only course of agricultural education possible, therefore, in most countries and States out of New England is to train the youth in the common branches first; and when he is fitted for entering upon the study of his profession, introduce him to the purely agricultural course. In Massachusetts, our common schools, with slight modifications, may be relied upon, with perhaps some brief preparatory studies in the lower class in our agricultural schools, for the necessary education preliminary to the studies peculiar to an agricultural education.

It may probably be necessary in some measure to modify the course of study pursued in the common schools, so as to lay a foundation early for a course of agricultural study. With this view, it might be well, perhaps, to introduce into them elementary treatises upon Chemistry, Physiology, Natural History, and such other branches as may harmonize the already existing system with the changes proposed. We content ourselves with the mere suggestion at present, relying on the wisdom of the Board of Education for any necessary modification in the common-school course of study.

Our conclusion upon the whole matter may be briefly stated in a few propositions:

1. A system of agricultural education is imperatively called for in Massachusetts.

2. Our common schools furnish the proper foundation for such a system.

3. Foreign countries furnish us no suitable models for agricultural schools, because of the differences in general education, as well as in the structure of society and government.

4. Existing agricultural colleges in this country furnish no such evidence or promise of success, as to encourage at present the establishment by us of a large State Institution.

5. A School of Agriculture, with an experimental farm, should be established in each county.

Agricultural Miscellany.

By R. S. Fay.

Grass and Pasture Lands.

There is no subject in agriculture which is exciting more attention at the present time, than the state of our pasture lands, which, it is generally admitted, are steadily deteriorating. It is spoken of at farmers' clubs; it is the frequent topic of agricultural addresses; and it is constantly alluded to in the agricultural newspapers. Nor is this to be wondered at, if we examine into the actual state of the case: one cannot travel through the country, in any direction, without seeing that there is just cause for apprehension, and that unless some effectual steps are taken to remedy the evil, agriculture cannot advance—worse than this, it must retrograde. The agricultural statistics of Massachusetts show the melancholy fact that the land is incapable of supporting as much stock, in proportion to the number of acres in cultivation and in pasture, as it did half a century ago. Sheep-husbandry, once a very considerable interest, has ceased almost entirely, and the rearing of cattle for beef and for the dairy, has

diminished very considerably. This is a melancholy conclusion to arrive at, but it is one from which it is impossible to escape.

Although much has been said of late upon the necessity and importance of restoring fertility to our pastures, but little practical information has been afforded as to the best and most economical methods of attaining that object. We seem to be afraid to look the evil in the face, and to measure the extent of it. A feeling of discouragement seems to come over us whenever we meet to talk about it, and many of our most intelligent farmers seek for temporary palliatives merely, or else abandon their pastures to their fate, leaving them to go back to their original condition of bush and forest. They timidly counsel an ignominious retreat before the devastation and waste which has been committed, and advise us to pull down our barns and build smaller, to narrow the extent of our cultivation, and diminish the amount of our stock—in short, to shrink up in every department of rural economy. We are not, however, of that number; nor are we disposed to yield without a struggle to this sad change of fortune, brought about by our own improvidence, believing that we have the power to restore what has been lost, if we set ourselves seriously about it. There is no occasion for despair, but on the contrary, there is ample encouragement in the attempt to make our grass fields more productive than they have ever been, if we adopt the right methods to insure success. In order, however, to enter upon this laudable enterprise understandingly, let us first inquire as to the treatment which our grass and pasture lands have heretofore received, by which they have been brought into their present low condition.

The land usually appropriated to grazing purposes, has been that which from its position, or its soil, or from these combined causes, is considered the least available for cultivation. Hilly ground, difficult to work, swamps not easily drained, and soils encumbered with rocks, comprise a large portion of the permanent pastures of New England. Besides these, many farmers have been in the habit of cultivating their smoother land, as long as it would bear a remunerating crop, applying as little manure as could be got along with, and then laying it down to grass, with rye, oats, or barley, so as to get the last ounce of

nutriment from the soil. This having been pretty thoroughly accomplished, a crop or two of hay is taken from it, and the land is then abandoned, in a famishing state, for a number of years, to pasture. From land thus treated, cattle are expected to derive their support for four or five months. They go to it in lean condition in the month of June, or even earlier, and they come from it at the end of October, as lean as they went out. This is briefly the history of a large portion of our pastures.

The remedy usually adopted for pastures that are capable of cultivation, has been by ploughing up and planting as we have above described, pursuing in fact a rotation in which grass and pasture forms the principal part. Many persons suppose that while land remains in grass, it is resting and preparing itself for raising another series of crops. Doubtless many farmers look with complacent satisfaction on their fields when thus *at rest*, and are calculating upon the good crops which their fields are to yield after one or two years' repose, forgetful of the nightmare, which in the form of cattle is preying upon its strength.* But there is no greater mistake than to suppose that land is recovering itself from an exhausting system of cultivation by simply leaving it to itself, even if a hoof does not disturb its surface. Land, if in the highest state of fertility, will degenerate, without skilful care and attention. If it is in grass, coarser herbage will gradually displace the finer and more nutritious kinds; briars and bushes come next in Nature's rotation, to be succeeded at last by the forest, to which almost all land tends. The farmer has therefore a continual struggle against this natural law of vegetation, unless he wishes, like the land he cultivates, to return also to his primeval condition, and to seek subsistence only upon the spontaneous fruits of the earth, and to clothe himself with the skins of the wild beasts of the forest. The let-alone principle will never do in agriculture; effort, constant effort, is needful to keep land productive; and, confining our attention for the present to grass lands which, even if capa-

* Every 1000 lbs. of hay is said to contain about 14 lbs. of nitrogen, 16 lbs. of phosphoric acid, 17 lbs. of potash, and 8 lbs. of lime and manganese; all of which should find its way back to the soil to insure its continued fertility.

ble of being cultivated, it is not desirable to do so from any cause, let us endeavor to ascertain the best and most profitable methods of giving to them increased fertility.

We have a very decided opinion upon this subject, although it is one about which we are well aware "doctors disagree." The best received opinion seems to have been until lately, that manure, in order to give the greatest benefit to the soil, should be ploughed in and incorporated with it, and that this rule applies with particular force to land which is intended to be laid down to grass. The reasons for this opinion are certainly very plausible, but our own experience has gone directly against it, and we have ventured, from time to time and on various occasions, to express ourselves to that effect. As it is a matter of very great interest and importance to the farmer not to make any mistake in this, the the most important department of rural economy, we propose, before going further, to state the case as fully and clearly as possible, and at the same time with a reasonable conciseness.

Let us begin, then, by presenting the following case, which has come within the experience of every farmer in Massachusetts. Here is a piece of land, which has been in cultivation and is now in grass, either as a field for hay or for the pasturage of cattle; the field has ceased to yield enough to supply the wants or the expectations of the owner. He does not wish, however, to turn it up and go through a course of cultivation,* provided he can accomplish the object of restoring it to fertility in grass, if he can do so more cheaply than by cultivation. Can it be done? If so, the same course of proceeding will apply with greater force to common pasture lands not capable of being cultivated.*

We believe that the most profitable way to increase the fertility of our pasture and grass lands is in the form of top-dressing. 'What! throw away manure on our bare pastures or close-cut fields, for the winds to blow upon them and the rains to wash them?' we think we hear some of our readers exclaim. We reply to them, in all calmness, that in our humble judgment

* Any course of cultivation of less than two or three years, it has been stated by practical farmers of great intelligence, is worse than useless, where the object is to get a good grass field again.

you can not throw them away; that the wind can not waste their virtues, nor the rains wash them out. Once upon the ground, the manure is as safe and quite as useful, as if buried in the ground. Every farmer can try this experiment for himself on a cultivated crop. He can plough a strip of land, turning in the manure a foot under, and on another part of the field he may plant his seed where the manure has been thrown on the surface or put there after the seed has been planted. He may also try it in another way: he may turn up a piece of grass land and put it into cultivation for three years; on an equal piece of the same land, he may apply, in the form of top-dressing, the same amount he puts into the ploughed piece, and if he will keep the account of each field for five years after both have been restored to grass, treating each alike, he will easily discover whether top-dressing is throwing anything away, and which has been cheapest.

Fortunately we are beginning to find confirmation of our experience from sources of authority. The late Thomas Gisborne, Esq., in an Essay, which, at the time of his lamented death, was found unfinished, and who was as distinguished for his practical good-sense in agriculture as he was for his high political position in the English House of Commons, noticing the theory of Liebig upon mineral manures, and the philosophical researches of others upon the action of manures generally, says:—

"And though we are by no means inclined to dispute, or even to doubt, that these philosophers have rightly established the singularly varying appetites and antipathies of our cereals and leguminæ, we can not forget that either by a wonderful chance, or by a special providence, the refuse of these vegetables taken almost indiscriminately, and the excrements of animals, taken in the same manner, form a compound in which every object of culture finds the elements necessary for its vigorous growth and perfection. And so universal—we had almost said equal—is the benefit, that, after thousands of years of experience, practical farmers are not yet agreed to what crop home-made manure is most beneficially applied; and whereas one man bestows it upon his wheat, another on his beans, and a third on his turnips, the fourth man lays it on his mowing land, to be, if we are to believe our modern instructors, exhausted by the sun, dissipated by the wind, and drenched by the rain. Strange as the statement may sound to some of our readers, we do not hesitate to oppose experience to philosophy and reason, and to declare our belief, that in no way is manure more effectually applied than in the manner last stated, by which we mean, that if the same quantity of manure which would increase a crop of wheat 50 per cent. be bestowed on the surface of a piece of upland meadow, it will increase the crop of hay in more than the same ratio.

Prof. Voelker, the Chemist of the Royal Agricultural Society of England, seems also to have arrived at the same conclusion. After a series of very careful experiments, he has found out that the loss of the stimulating properties of manure, and more especially of its ammonia, is very insignificant in amount, whether in large heaps or small, whether spread over the surface of the soil, or buried beneath it. Of course, sound judgment is to be applied as to the time of application, dependant upon the nature of the soil and the state of the weather, in order to derive the greatest possible benefit from the application. No one would think of spreading his manure upon the soil, when in a completely inert state, from being hard bound with frost, or parched with a long summer drought; but the truth, lying at the bottom of our practice, is to us clear as a crystal, which is, that whenever you can plough your land in order to cover your manure, you may, without loss to its virtues, leave it upon the surface. We have no disposition to press too strongly our individual experience or opinion upon this point, although from the cost of labor in Massachusetts, the question presented is one of great importance. We shall therefore content ourselves with the expressed opinions of other writers upon this subject, to show that if we err, we are not alone in our errors.*

Professor Voelker says "that on all soils with a moderate proportion of clay, no fear need be entertained of valuable fertilizing substances becoming wasted, if manure cannot be ploughed in at once. Fresh, and even well rotted 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."

* The premiums offered by all the agricultural societies of the State, under the direction of the State Board of Agriculture, for the given experiment upon the application of manures, will perhaps solve this question, so far as our soil and climate are concerned. The manner in which these experiments are to be tried is in some respects open to objection, if a complete and satisfactory result, to be drawn from the comparison of numerous trials, is expected; but much valuable information will be obtained, if intelligent farmers throughout the State will interest themselves in the matter. In order to be valuable, great care and accuracy will be necessary in every proceeding connected with the experiments.

We take the following from the Journal of Agriculture, &c., of the Highland and Agricultural Society of Scotland:

"There being a difference of opinion among scientific persons regarding the advantage of spreading dung on the surface, and leaving it exposed for some time before covering it in, Professor Legnitz, of Eldena, (Prussian Agricultural School,) had recourse to experiment for the solving of the question. For this purpose, he selected 2½ roods, which he divided into four equal parts. To No. 1 no manure was given. No. 2 received about two tons of farm-yard dung, which was spread immediately, and covered in by means of a plough. No. 3 was treated in the same manner, with this difference, that the hoe was used instead of the plough. The same quantity of dung was carried to No. 4, and allowed to remain spread for three weeks on the soil, before being covered in by the hoe. On the 10th of October, the four lots were subjected to experiment, and were sown with about 95 pints of rye seed each. The following are the total results of the crop from each lot, grain and straw included:

No. 1	produced	583	lbs.
" 2	"	770	"
" 3	"	818	"
" 4	"	935	"

"We do not by any means consider this experiment conclusive, as there are several particulars not mentioned, such as the state of the weather, when the dung was lying exposed and the kind of soil, but which we would like to have seen stated. Still it is striking enough to warrant the repetition of it on a larger scale."

The following extract is from the American Farmer of July 1859:

"Top Dressing with Putrescent Manures.—The subject of manuring generally is one of especial interest to the farmer, and it is of the utmost consequence that right principles should be established and promulgated. Several years ago we began to call attention to this subject of surface manuring, not as a new thing, not as claiming any originality with respect to it, but because an old *theory* almost universally received, and constantly maintained by writers claiming to be scientific, stood in its way. It was the theory that the waste of ammonia by the exposure of putrescent manure upon the surface was a loss of its whole value, and that to leave it so exposed was to throw it away. It required some courage in the face of every thing almost that was considered authority, and the very general sentiment of the farming community to set forth the opinion which we expressed in the May No. of the *Farmer*, 1856. Nor is there any occasion for accumulating manures in stables and barn-yards, to be carried out carefully at the busiest season, and spread before the plough, and turned under immediately "or sooner," according to the stereotyped directions for such cases made and provided. They may be and should be taken away from time to time, before they accumulate, and spread out upon grass land or corn land, or wherever there is occasion for them. We know that

teachers of science will shake their heads over the wanton waste of *ammonia*, but we cannot help it. We *know* that these suggestions will stand the test of trial, and practical men must stand by their facts. If the doctors do not understand how it is, let them bide their time. When science becomes more familiar, she will explain it to them.

"Whether the famous experiments of Professor Voelker, of the Agricultural College of Cirencester, were instituted on this hint we do not know; but it was a coincidence at least that during the summer following they were made, and our own editorial, commenting upon, and further supporting with facts, the deduction of that learned gentleman, was copied at large into the *Farmer's Magazine*, the leading agricultural monthly of Great Britain. These experiments established beyond question the error of the old theory, and sustained by the very numerous facts which the discussion has brought out, and the observation and judgment of practical men in that country and this, the community is not likely to be further misled on the subject to very great extent. We wish, however, from time to time to keep the matter in mind, and to furnish any new facts which may come under our notice. After harvest, it is desirable to clear the yards of every thing that may have been left over from winter, and accumulated since. Under the prevalence of the common notion, great fear is entertained that the strength of the manure will be lost unless immediately ploughed under, and to do this may not be possible. Let the principle established by Professor Voelker be then kept in view, viz.: that fresh manure contains a very inappreciable quantity of volatile ammonia. That the odor arising from fresh manure does not indicate the waste of any valuable quality. That volatile ammonia is formed only as the manure rots, and in spreading on the surface, the nitrogen, which is not volatile, is washed down by the first shower, and preserved by the roots or the litter, or the surface soil from waste. There need therefore be no fear of waste from evaporation.

"Within a few days we have learned some facts bearing upon this point. Dr. C. M. Jones, of St. Mary's county, was decidedly satisfied of the necessity of ploughing under fresh manure immediately. Having a piece of tobacco ground in course of preparation, he was covering such land with manure, and ploughing under at once. It happened that the manure could not be got upon the ground toward the close without keeping the ploughs waiting; so that the last land was ploughed first, the manure thrown on the surface and worked in, in the preparation for planting. This last piece showed its superiority throughout the growth of the crop. Just the same thing occurred in his cornfield. His manure was taken to the field and applied heavily along the furrow, bedding the earth over it. But a portion of the land was prepared first, and a lighter manuring on this, shewed much superior results. A similar experience occurred with his wheat cultivation. Manure was hauled upon the ground early in August to be ploughed under; but a portion, owing to the dry weather, was spread, but left unploughed for weeks, and the effect was as striking as in the other cases.

"At Mr. Hewlett's we had the opportunity of remarking recently the effect of Peruvian Guano as a top-dressing during three successive years. It was applied two years ago to a hill-side when in wheat, and the effect in that crop was very apparent. This spring, two years after, it is equally apparent in the

heavy growth of orchard grass. On another piece of land the timothy had entirely run out, except upon a strip which, owing to its being thinner than the rest, was top-dressed with Peruvian Guano. On this the timothy is still vigorous and well set."

We cannot resist quoting one more confirmation of our views upon this matter by a contributor to the Boston Cultivator:

"Some writers," he says, "upon the subject, tell us to plough in our manure deep, without exposure to the atmosphere, while the majority of our practical farmers in effect, follow this teaching to some extent by burying the manure in the bottom of the hill or furrow. We confess that we commenced farming with the idea that the better way was to plough in manure deep; that if we did not get the benefit of it the first year, we should the second; but time, which in every thing produces numerous changes, has somewhat modified this opinion, as in looking back a dozen years or more, we can trace the most satisfactory results to those cases, where the manure was applied as top-dressing, and harrowed in." * * *

* * * "I have applied manure in this manner several times to land which I planted with corn, and had good crops without manuring in the hill. I have followed this method in producing wheat and potatoes, and I think it the best way in which fine manure can be used."

We think we have said enough in favor of the surface application of manures to grass lands, without going into the question of its economy as compared with turning up and cultivating it, because that is a matter which is very easily solved, each one for himself. It may be necessary to break up some lands, to fit them for the use of the mowing-machine, or for some other equally good reason. Our remarks are intended to apply only to those cases, where the only object in breaking up, is to get the land into a good grass-bearing state again, as cheaply and quickly as possible. We think it can be best and most economically done by top-dressing.

But it may be asked, "What do you propose to do with grass lands which are so run out that many of the grasses have entirely disappeared?" We are fortunately saved from much labor in answering this question, it having been lately considered in the *Farmer's Magazine*. A careful perusal of the article will satisfy any one that manuring is all that is necessary to reproduce the best grasses upon grass and pasture lands. This seems, at first thought, to be a very absurd proposition; a little reflection, however, prepares us to admit the possibility of its being done.

If you burn over a field, for example, the vegetation that springs up—the dock, the fire-weed, the birch—are all new to the soil, apparently; just as in burning over a pine forest of a century's growth, the oak will spring up in place of the pine. The plant or the seed is there, and may have been there for ages, patiently awaiting for the event which brings it to our view. We copy the entire article from the Magazine, because it is full of practical science, and, withal, exceedingly suggestive.

The Effect of Manure on the Grasses of Pasture Land.

By Cuthbert W. Johnson, Esq., F. R. S.

It was an observation of a very early date that the grasses grow without the aid of man; and it was almost as soon discovered, that by certain dressings the land was readily induced to produce particular plants, and to cease to yield others. It was noted, for instance, that couchgrass or twitch appeared to follow the footsteps of the arable-land farmer, let him manure his land in whatever way he might.

In more modern days, when artificial manures began to be employed, similar observations were made. The farmers who used peat ashes observed, that when these were spread on pasture lands, that the white clover seemed to grow, as it were, spontaneously: the site of a wood fire becomes speedily tenanted by the same plant. In still more recent times the application of crushed bones produced a similar result. The effect of their use at Welbeck, on grass land, was many years since described to me, by the late Duke of Portland, in a letter, in which he observed: "They appeared so much to encourage the growth of white clover, that I had almost formed the opinion that it was superfluous to sow the seed." And, as I have elsewhere remarked, the honest Nottinghamshire farmers of those days had many a puzzling, learned cogitation, upon this strange yet regular appearance of white clover wherever bones were applied. They, however, wisely recollecting that the bones chiefly came from the very land of fine white clover seed, strongly suspecting that the seed came in the bones. The Lancasterian and Cheshire farmers, who as copiously dressed their fine pastures with bones, had no faith in the correctness of such an explanation, since they found that the white clover sprung up just as abundantly after the use of the *boiled* bones of the size-makers, as it did upon the lands manured with those in a fresh or green state.

Even the use of rich food for the stock feeding on pastures, produces the most considerable results on the quality of the herbage. Oil-cake given in this way is powerful in its effects. Mr. G. Dobito has briefly described a case of this kind, (Jour. Roy. Ag. Soc., vol. vi., p. 76). He says: "A friend of mine has lately adopted a plan which, under the same circumstances, I should strongly recommend; it is that of giving a small quantity of oil-cake to grazing animals for the sake of improving an ordinary pasture field; its effects are astonishing. The pastures I alluded to are small, and one or two bullocks more than they are calculated to carry are put into each of them. They are then allowed four pounds of cake per day per head: this at a cost of about two shillings per head

per week, which I believe the stock well paid for, has entirely altered the face of the pastures from what they were three years ago, when my friend first adopted the plan."

The *effect* of certain top-dressings, then, upon the *kind* of herbage growing in a pasture has been long known; but the *extent* of that influence, till the recently reported laborious trials of Mr. J. B. Lawes and Dr. Gilbert, was not so well understood. The results of these researches are reported in the last and present volumes of the Journal of the Royal Agricultural Society of England.

The soil of the half-acre plots of natural pasture at Rothamstead, on which these trials were made, is a somewhat heavy loam, with a heavy clay subsoil resting on chalk.

These plots were *yearly* dressed in February or March *with one and the same kind of manure.* But each plot had a different *kind* of manure: two plots, however, for the sake of comparison, were left unmanured.

After three years' experience, these plots were in 1858 botanically examined. The result of the examination will be found in the following table, (Jour. Roy. Ag. Soc., vol. xx., p. 250):—

Plot.

1. was one of those left unmanured.
4. had been *annually* dressed per acre with 200 lbs. of sulphate of ammonia, and 200 lbs. of muriate of ammonia.
8. with mixed mineral manure, composed of—
   200 lbs. bone ash. } Sup. phos. of lime.
   150 lbs. sulphuric acid, }
   300 lbs. sulphate of potash,
   200 lbs. sulphate of soda,
   100 lbs. sulphate of magnesia.
10. with the same as plot 8, and 200 lbs. of sulphate of ammonia, and 200 lbs. of muriate of ammonia.
13. with the mixed mineral manure, the same as plot 8, and 400 lbs. of sulphate of ammonia, and 400 lbs. of muriate of ammonia.
16. with 14 tons of farm-yard manure.
17. with 14 tons of farm-yard dung, and 100 lbs. of sulphate of ammonia, and 100 lbs. of muriate of ammonia.

Let us next see the effect of these applications, using, as much as possible, the words of Mr. Lawes and Dr. Gilbert, who have so long aided each other in these and other valuable agricultural inquiries.

As regards the general character of the herbage of the experimental meadow, it may be well to give their preliminary remarks, viz., that in the third season (1858), to which their table of separations refers, there was no *dactylis glomerata* (rough cock's foot), no *poa pratensis* (smooth-stalked meadow-grass), no (*bromus mollis* (soft brome-grass), and no *avena pratensis* (meadow oat-grass), detected in the produce of the *unmanured* plot. The rough cock's foot and smooth-stalked meadow-grass occurred, however, on some of the manured plots; and each in large proportion under certain conditions of manuring. But the soft brome-grass and meadow oat-grass occurred in very few cases at all, and then in very small quantity. There was, too, a striking absence, on all the plots, of several esteemed permanent meadow-grasses. Thus, *alopecurus*

pratensis (meadow foxtail), *festuca pratense* (meadow fescue), *f. duriuscula* (hard fescue), *phleum pratense* (meadow cat's-tail), and *poa trivialis* (rough-stalked meadow-grass), were not found in our list at all in the third season, 1858. The meadow foxtail, the meadow cat's-tail, and a fescue grass were, however, each observed on one or more of the plots in 1857.

The table of the remarkable effects of the different descriptions of manure upon the complex herbage of which the meadow was composed, in developing the different kinds of plants, is thus introduced by Messrs. Lawes and Gilbert:—

"Allusion has already been made to the greater development of the *leguminous* herbage by purely *mineral manures*, and to that of the *graminaceous* plants, or natural grasses commonly so called, by characteristically *nitrogenous manures*. In fact, the plots had so distinctive a character in regard to the prevalence of different plants, that the experimental ground looked almost as if it were devoted to trials with different seeds as with different manures. So striking and characteristic, indeed, were the effects produced in this respect, that, in 1857 and 1858, the subject was thought of sufficient interest to induce us to request the examination of the plots by Professor Henfrey, to which he kindly assented.

"An endeavor was also made in the second year, 1857, to separate and determine the proportion of the different plants in carefully averaged and weighed samples, taken from the several plots as soon as the grass was cut. Taking advantage of the experience gained in this first trial, the separations have been carried out more carefully in the case of the produce on some of the most important plots in the third season, 1858. The results of these separations are recorded in detail in the table.

"The mode of proceeding in making the separations and estimations may be shortly explained. As soon as the grass on a plot was cut down, samples were taken from many parts of it. These were carefully intermixed in such a manner as to shake out as little seed as possible; and then, from the whole, a certain quantity was weighed out, to be further operated upon. Characteristic specimens of each of the plants *in flower or seed*, or in other conditions in which they could be recognized, were then selected as types; and a number of boys were set to pick from the wieghed sample all they could find to correspond with these types. The remainder consisted chiefly of *detached foliage and undeveloped stems*, which was then separated into four or five different lots, according to types selected to the best of our judgment. Each weighed sample was thus divided into from fifteen to twenty different descriptions of herbage. The weight of each of the selected portions was afterwards taken — all in an equal state of dryness. The weight so obtained, of the respective grasses, or other plants, or parts of plants, in the original weighed sample from the plot, were then calculated into their percentage relation to the collective weight of the whole of the separated portions in their partially dried state. It is the results so obtained that are recorded in the table."

Attention may now be directed to the comparative development of each of the plants according to the manure employed, taking each *seriatim*, in the order in which it predominated on the unmanured land.

The following tables, then, will give the amount in 100 grasses of the different varieties growing in 1858 on the unmanured plot, and on the plots manured for three years with the same dressings:

DESCRIPTION OF HERBAGE.	PERCENTAGE AMOUNTS OF EACH PLANT, &c.						
		Artificial Manures.				Farm-yard manure.	
	Unmanured.	Ammoniacal salts alone.	Mixed mineral manure.	Mixed mineral manure and ammoniacal salts	Mixed mineral manure and double quantity ammoniacal salts.	Alone.	With ammoniacal salts.
	Plot 1.	Plot 4.	Plot 8.	Plot 10.	Plot 13.	Plot 16.	Plot 17.
1.—GRAMINACEOUS HERBAGE; STEMS BEARING FLOWER OR SEED.							
Common rye-grass	16.77	14.73	23.39	32.23	12.10	29.00	14.92
Woolly soft grass, or Yorkshire Fog.	14.02	14.43	6.94	32.64	26.37	10.75	19.87
Fibrous-rooted, tall, oat-like grass	6.04	3.27	9.07	4.84	2.56	14.33	17.16
Sweet-scented vernal grass	5.43	0.41	1.01	0.09	....	0.34	0.66
Common or creeping-rooted bent grass, also black switch, &c.	4.82	0.97	0.03	1.48	2.16	....	1.25
Common quaking grass	2.07	0.41	1.01	....	....	....	....
Crested dogs'-tail grass	1.10	0.05	0.39	....	0.05	0.45	0.26
Rough cock's foot	....	1.64	....	1.38	20.17	....	....
Smooth-stalked meadow-grass	....	....	....	....	....	14.89	10.10
Soft or downy brome-grass	....	....	....	....	0.10	....	....
Meadow oat-grass	....	....	0.34	....	1.57	....	0.40
Total	50.25	35.91	42.18	72.66	65.08	69.76	64.62
2.—GRAMINACEOUS HERBAGE; DETACHED LEAVES AND INTERMINATE STEMS.							
Leafy produce—from woolly soft grass	3.41	12.28	5.46	4.06	15.35	2.24	5.55
Coarse leaf, &c.—some bent grass; probably also cock's foot, soft brome-grass, and others	8.78	11.46	1.79	6.64	3.93	3.58	1.32
Middling leaf, chiefly bent grass, some meadow oat-grass, &c.	3.41	8.18	14.33	4.43	....	4.03	....
Fine leaf, &c.—unknown	7.81	16.37	5.82	2.58	1.18	4.48	4.22
Dead leaves and stems	2.44	4.91	2.24	7.01	11.81	3.58	3.96
Total	25.85	53.20	29.64	24.72	32.27	17.91	15.05
3.—LEGUMINOUS HERBAGE.							
Yellow or meadow vetchling	2.07	2.20	4.53	....	....	2.02	1.32
Common bird's foot treefoil	1.83	....	0.45	....	....	....	....
Perennial red clover	1.22	....	17.91	....	....	1.68	0.46
Total	5.12	2.20	22.89	....	....	3.70	1.78
4.—MISCELLANEOUS HERBAGE, CHIEFLY WEEDS.							
Rib-grass or plaintain	10.79	0.41	....	0.09	....	1.96	8.25
Common caraway	1.71	....	0.78	0.28	....	1.62	1.72
Common milfoil or yarrow	1.34	3.58	0.48	0.28	0.59	0.22	1.78
Sheep's sorrel or dock	0.67	1.02	0.23	0.88	1.08	1.12	3.10
Catchfly	0.61	....	....	....	....	....	....
Crow-foot	0.49	1.13	....	....	....	2.02	1.58
Field wood-rush	0.12	....	....	....	....	....	....
Germander speedwell	....	....	0.22	....	....	0.11	....
Common yellow-flowered bed-straw, or cheese-rennet	....	....	....	0.32	....	....	....
Total	15.73	6.14	1.71	1.85	1.67	7.05	16.43

The general conclusions at which the authors of this section of a very valuable series of trials arrive, are thus summed up:—

"1. That, whether the produce of hay be considerably increased by means of farm-yard manure alone, farm-yard manure and ammoniacal salts, or artificial mixtures of suitable mineral manure and ammoniacal salts, the proportion of the whole which will be *graminaceous* will be very much increased.

"2. That the produce will be far the *most graminaceous* when the "*artificial mixtures*" are employed. In fact, when the increase of hay is obtained by artificial manures containing *both the necessary mineral constituents and ammoniacal salts*—and it is then greater than under any of the other conditions—both the *leguminous* and the weedy herbage are nearly excluded, and the produce is then, therefore, *almost wholly graminaceous.*

"3. That the *graminaceous produce itself*, when grown by *farm-yard manure*, is less complex in character than that grown *without manure;* whilst that grown by the *most active artificial manures*, is *less* complex still.

"4. That up to an equal period in the season, the *graminaceous* produce, grown by the *active artificial manures*, will be in larger proportion in *flowering and seeding stems* than that grown without manure; and that the produce grown by *farm-yard manure* will be in still larger proportion in that condition.

"5. That the *description* of the produce grown by *farm-yard manure alone* was, upon the whole, superior to that grown *without manure.*

"6. That when the crop was further increased, by the *addition of ammoniacal salts to the farm-yard manure*, the character of the produce was somewhat deteriorated, both in regard to the *description* of the *useful plants* grown, and on account of the large proportion of *miscellaneous* or *weedy herbage* then developed.

"7. That, when in a *mixed mineral or ammoniacal manure* the ammoniacal salts were *not used* in *excessive amount*, the herbage, which was then almost exclusively *graminaceous*, and comprised also but *very few species*, nevertheless, included a considerable proportion of grasses of recognized good quality. But, when *excessive amounts* of *ammoniacal salts were employed*, the character of the produce was deteriorated, both in regard to its *condition*, and to the *description of the grasses* that were developed."

The effect produced by these different dressings for grass land in these experiments is very interesting. We have here carried out a still more valuable, yet somewhat similar series of inquiries to those of Professor Buckman, on the results of irrigation upon the natural grasses of a meadow. The Professor's labors were directed to the results of watering land; but the *object* was similar to those carried on at Rothamstead. In both cases the attempt was successfully made to ascertain the changes produced in the natural grasses of a pasture by artificial applications—solid dressings being employed in the one case, river water in the other. Of the experiments of Professor Buckman (Jour. Roy. Ag. Soc., vol. xv., p. 402) I have elsewhere given a digest (Farmers' Almanac, vol. vii., p. 229). The Professor gives the following example of a meadow sloping to the banks of the Churn, near Cirencester, and notes the changes which have taken place since it was partially irrigated. This field had a subsoil of oolitic gravel. The following table gives—I., the name of the grasses; II., the proportional before irrigation; III., after two years'; IV., after four years' irrigation.—

I.	II.	III.	IV.
Meadow foxtail	1	2	4
Field meadow	2	3	4
Roughish meadow	1	2	1
Quaking grass	2	..	..
Dogstail grass	2	1	..
Hassock grass	1	..	..
Marsh bent	1	2	3
Cock's foot	1	2	3
Yellow oat	2	3	3
Soft oat	1	1	1
Meadow barley	1	2	2
Perennial rye	2	4	6

These changes, continues Mr. Buckman, become evident when there is a gravelly subsoil; stiff clays, without there is a stratum of lighter matter, seldom succeed so well under irrigation. The changes which take place with the herbs of improved pasture are still more striking. The following table gives an instance of this. Column I. gives the trivial name; II., III., and IV. the proportional number before, after two years', and after four years' irrigation:

I.	II.	III.	IV.
Upright meadow crowfoot	1	3	1
Bulbous crowfoot	3	1	..
Narrow-leaved plaintain	3	..	..
Dutch clover	2	..	..
Broad clover	1	2	2
Common beaked parsley	1	2	1

This field, it seems, trebled in value in four years.

These experiments are of considerable importance; for not only do they show that it is within our power to add, by certain dressings, to the produce of the grasses already existing in a pasture, but that the grasses themselves, by the soil being thus manured, may be changed — good kinds brought forth, and the growth of the inferior sorts discouraged. Such experimental inquiries give us, with far more precision, facts of which our forefathers were not altogether unacquainted They could not but observe many of the changes in the grasses, produced by some of the dressings to which I have alluded. They could not but remark that the difference between good and bad pastures is, in very many cases, merely the result of their cultivation. Instance, as Mr. Buckman remarks, a poor clay ameliorated; its list of grasses will not remain the same, or in the same proportions; on the contrary, bad grasses, which are ever present, to some extent, in every pasture, will either all die out, or, if not so, they will greatly improve in quality; whilst many good ones, of which scarcely an example could previously be found, rapidly increase. And again, the many herbaceous plants, such as the broad-leaved plaintain, common daisy, bulbous crow-foot, &c., give place to a growth of grasses. Facts like these, I repeat, former generations of farmers must have noticed; but they had not then the scientific accuracy, necessary to reduce these observations to anything like a useful degree of certainty.

The higher relative value of their cereal crops, in those days, indeed, made them more careless of their grass land; but a different state of affairs in our time

naturally adds to our interest in everything that promotes the growth of food for our live stock. We may well, then, rejoice to see science at last well directed to those grass lands, for which hitherto so little has been done, as to well justify the observation that "the grasses are nature's care." These experiments will, moreover, lead to others of equal, if not greater importance — researches not confined to the action of manures upon the natural grasses.

We have thus far treated the subject of grass and pasture lands, as if farmers were possessed of the requisite capital to put them in condition in the best and most rapid manner by the use of manures. Our remarks have been less in detail than we could wish, because a thorough examination of the subject would occupy too much space; but we think that we have said enough to correct some popular fallacies in relation to the treatment of grass lands. At all events, we hope that what we have said, will tend to excite a spirit of inquiry and of practical observation, which may lead to good results. We trust that farmers will soon learn, that manure is as important and as profitable in its use, when spread upon the sod, as when employed in culture under the plough, and that land, intended to remain permanently in grass, must be manured just as we are obliged to use fertilizers in any other crop, and that manure so applied yields quite as much profit, to say the least, as if a course of culture is adopted solely with the view to restore it to fertility in grass. There are, however, other methods of ameliorating and improving grass lands, especially those which are incapable of cultivation, which are not to be overlooked. Of these, sheep-husbandry is one of the most important; and as we propose to occupy a few pages, in a general consideration of this much neglected branch of agricultural industry, its effects upon grass and pasture lands will necessarily come under notice.

Sheep-Husbandry.

As long ago as when Fitzherbert wrote his "Treatise on Husbandry," the breeding of sheep was looked upon as one of the most important elements of success to the farmer. He says they are "the most profitablest thing that a farmer can raise." This was written more than three centuries ago. Ellis, who followed him long after, says, "Sheep, of all beasts, next to horses

for ploughing and carting, are the most necessary of all others to the farmer, for the profit of their folding, for their wool, and for their flesh ;—to make this beast answer to the greatest profit, is what all farmers aim at." In Great Britain sheep-husbandry is still one of the most prominent features in its agricultural industry, the number upon British soil, an area not much larger than some of our States, being upwards of 50 millions.* Sheep, from their power of adaptation, seem always to be in their place, whether ranging the almost inaccessible hills and mountains, flourishing upon what would otherwise be wasted, or feeding in rich valleys and in highly cultivated districts. They are peculiarly adapted to the climate and soil of New England, and are well suited to almost every part of the United States. Our position as manufacturers, consuming in Massachusetts a large portion of the product of the whole country, with a ready demand for the meat at high prices, makes it appear the more extraordinary, that sheep-husbandry has been so much neglected. The number of sheep in this State has been declining for many years, so rapidly, indeed, that there is not at the present time more than one-fourth of the number in the State, that there was forty years ago. This is a melancholy fact, when we consider the great importance which sheep-husbandry is confessed to be, in progressive agriculture.

Not long since this Society issued a circular, which was very generally distributed throughout the State, asking for information upon this subject. (See page 160, Part 1.) Quite a number of replies were received. Among other questions asked was, "Do sheep, in your opinion, improve pasture lands?" The answer to this question was unanimously in the affirmative, especially on

* England has 55,000,000 sheep producing 250,000,000 lbs. of wool annually; the United States about 19,000,000, producing only 45,000,000 lbs. New England consumes in her manufactories more than half the amount of wool grown in the United States. The amount of foreign wool imported is about 20,000,000 lbs. These, however, are mostly the coarser wools, and the introduction of them is beneficial to the home producer, by enabling the manufacturer to produce a wider range of fabrics, for which American wool is unfit, without the admixture of foreign wools. The introduction of Saxony, Spanish, and afterwards of Colonial wools, into England, free of duty, doubled the woollen manufactures, and the price of English wool, instead of falling, as it was feared, rose in a very few years, more than 60 per cent.

pastures, where the coarser grasses, briars and bushes were coming in. Our own observation, and experience has fully confirmed the correctness of the returns in this respect. We have constantly under our eye a hundred-acre lot, upon which cattle, a few years ago, could not live, that now maintains in good condition a large flock of sheep, and the improvement of the pasture has already been so great, that a dozen head of cattle, besides the sheep, now do well upon it. The reasons for this are obvious to any one, who has observed the habits of sheep. They are more indiscriminate feeders than cattle; they nip the shoots of almost every shrub as well as weed, extirpating many kinds in the course of two or three years. They make room in this way for the grasses to come in, where they have been shadowed out, or otherwise displaced. The white weed, the broom, or wood-waxen, as it is commonly termed, the golden rod, the blackberry vine, the blueberry, with many similar plants disappear before them, and the finer grasses and white clover take their place.

This, however, is only one of the many advantages which sheep possess over cattle, upon pastures which are impoverished. They scatter their manure in the way to produce the largest benefit, besides which, it possesses in the highest degree the requisites essential to restoring to the land the phosphates, which it loses from long depasturing with cattle. The manure, too, of sheep, suffers no waste, being in a highly concentrated form, and at the same time, it is minutely divided and evenly distributed over the surface of the ground. So good and so economical a distributer of manure is the sheep, that experienced farmers are feeding them, when in pasture, upon oil-cake, for the additional benefit of the manure. Mr. Hamilton, a distinguished agriculturist in Ireland, in a communication to the Farmers' Magazine, for February, 1859, says:—

"The experience of the practical farmer has, long ago, convinced him, that bought food does not pay for itself in the increase of beef and mutton, but that a manifest improvement takes place in pastures, where sheep have been fed with oil-cake." He then goes on to show, from a series of careful experiments, the gain which the oil-cake gives to the sheep and the gain to

the pasture in the form of increased ammonia and phosphate of lime in the manure. We give his conclusion in his own words: "I am not chemist enough to do more than to point out the general bearings of Dr. Apjohn's analysis, but I think I have sufficiently opened the question for others more qualified to take it up, and shown the practical farmer that where he gives artificial food to his sheep, out of every £10 expended, at least £8 15*s.* goes to the improvement of the land." If this be an approximation to the truth, sheep are better manure distributers, than any machine which has yet been invented.

One of the questions contained in the circular before referred to, was, "What is your calculation of the profits derived from sheep, taking into account food, labor, &c.?" The answers to this question varied very much, ranging from $1.50 per head to $4. This might have been expected from the well-known fact, that very few of our most intelligent farmers, we regret to say, are accustomed to the details necessary to a correct estimate of the profit and loss of any farm operation, and more particularly as to stock; the same looseness in mercantile or manufacturing pursuits might be fatal in a twelve-month. This question, however, is vitally important; because without something approaching very closely to accuracy, as to the cost of maintaining sheep can be arrived at, the advantage of sheep-husbandry to the farmer cannot be ascertained. Mere figures, representing the value of food in money, are very unsatisfactory, since the cost of different articles of food varies in different localities. What the person, desirous of commencing sheep-husbandry, wants to know, is, what food is wholesome for sheep, the relative value of each kind of food, and the amount required to keep sheep in a fair thriving condition. With these facts before him, he can select those most available in his locality, and he will be able to form a correct judgment, as to the profit he can derive from sheep husbandry. We have seen it frequently stated, that in the climate of New England and New York ten sheep require for their winter's keep a ton of hay, or, in other words, that to carry ten sheep through the year, it will be necessary to give them in addition to their pasturage one ton of good English hay. This is, however, too small an

allowance for any sheep that it is profitable for a farmer to keep, besides, it is too indefinite as a rule for any one safely to act upon it. Hay should be taken as the standard only, and in speaking of it, we must understand it in that light, viz:—hay, or some other suitable food for sheep, which is equivalent to it in nutritive value. It is therefore necessay to ascertain, in the first place, what is the proper allowance for sheep, taking hay as the standard, and then to find out, what are the equivalents in other articles, which may be fed to sheep with equal advantage in the place of it. Keit, a high authority upon this subject, lays down the rule, that 2½ lbs. of hay, of the best quality, is necessary for every 100 lbs. of live weight, daily, to keep a sheep in good condition, while Spooner, one of the latest writers on the subject, says that 3⅓ lbs. is necessary for the purpose. We are inclined to adopt, as the rule, a mean nearly between the two,—to take 3 lbs. of the average quality of hay to every 100 lbs. of live weight, as the quantity required to winter sheep, so as to get the most profit from their wool and flesh.

We have now to ascertain what other articles of food can be raised or purchased in this State, which are or may be fed to sheep, and to ascertain their nutritive value as compared with it, so that hay may be wholly or in part dispensed with,—always bearing in mind, that variety in food adds something to the benefit derived from the food itself beyond its stated value. The same reason that causes sheep to thrive better by a frequent change of pasture, applies to a frequent change of food in the fold,—a truth of such importance in sheep-husbandry, as to make it, in the opinion of many, the chief element of success in the management of sheep.

We now give the table of food for sheep, with its relative value, taking the best quality of hay as the standard, and selecting those articles which are likely to be, more or less of them, within the reach of every farmer:

100 lbs.	of	good	hay	is equal to	90	lbs.	of	clover.
"	"	"	"	"	102	"	"	aftermath.
"	"	"	"	"	374	"	"	wheat straw.
"	"	"	"	"	442	"	"	rye straw.
"	"	"	"	"	195	"	"	oat straw.

100 lbs.	of	good	hay	is	equal	to	153	lbs.	of pea straw.
"	"	"	"	"	140	"	"		bean straw.
"	"	"	"	"	339	"	"		mangold wurzel.
"	"	"	"	"	504	"	"		common turnips.
"	"	"	"	"	276	"	"		carrots.
"	"	"	"	"	308	"	"		Swedish turnips.
"	"	"	"	"	45	"	"		clean wheat.
"	"	"	"	"	54	"	"		barley.
"	"	"	"	"	59	"	"		oats.
"	"	"	"	"	50	"	"		indian corn.
"	"	"	"	"	45	"	"		peas.
"	"	"	"	"	45	"	"		beans.
"	"	"	"	"	105	"	"		wheat bran.
"	"	"	"	"	167	"	"		wheat & oat chaff.
"	"	"	"	"	45	"	"		linseed oil-cake.*
"	"	"	"	"	45	"	"		cottonseed oil-cake.

It will be understood by every reader that these values or their equivalents, are only an approximation to the truth. Each of them, as well as the standard hay, vary in value on different soils and in different situations, but they are known, from long experience and observation, to be sufficiently correct to guide one safely in the practical operations of feeding, and they are also accurate enough, to enable one to calculate the cost of feeding, where either or all of these are used. The great advantage, to be derived from a table like this is, that it enables the sheep-grower, to take advantage of the cheapness of any article of food which he finds there, in order to replace some other which is more costly. For example, if hay should be unusually high in price, and some other articles should be unusually low, the sheep-feeder, knowing the relative nutritive value of them, can effect a material economy by the use of those, in part at least, which are the cheapest, taking care always to vary the food as

* The return in manure from oil-cake is very much greater than for any other food given to sheep, which is not taken into account in fixing its nutritive value. (See ante p. 285.)

much as possible, and to use a due proportion of the bulky with the more concentrated kinds.*

In estimating the cost of wintering sheep, with a view of ascertaining the profitableness of the pursuit, the value of the manure left in the sheepfold must be taken into the account, which is, as it will be seen, a very important element to be considered in arriving at a correct conclusion.

"The nitrogen in dung is that organic element to which must be attributed its chief enriching quality. The nitrogen is the basis, both of the production of ammonia and of the formation of nitrates, and the quantity of nitrogen in manures will form a very good element for the estimation of their value. Manures will be found rich, in proportion to their quantity of nitrogen or their power of forming nitrates. This is the great and first cause of the enriching power of dung. Though the action of all excrements has been referred to their own organic parts only, common experience tends to the explanation which has been given of the joint action of all their parts."

---

* The following extract of a letter addressed to a friend in answer to an inquiry as to the winter treatment of sheep, may not be considered irrelevant:

"The kind of food supplied to sheep is of hardly greater importance than the method of giving it. Sheep are powerful digesters and are capable of converting the driest and coarsest herbage into food, and to extract from it more nutritive matter than any other animal; in proportion to their weight, they will consume, therefore, a larger amount in bulk. The instinct of sheep leads them, accordingly, to select high and dry grounds, and to rang widely, feeding upon every variety almost of herb and shrub. Linnæus found, by offering fresh plants in the ordinary mode of feeding, that horses ate 276 species, and refused 212; cattle ate 276 species, and refused 218; while sheep took 387 species, and only refused 141. I have taken advantage of these facts in my winter management of sheep, giving them a fair amount of nutritive food of every kind that it was good economy to use, to keep them in condition; but whatever the kind might be, I make it a point to add enough of a coarse and bulky nature, to keep their bellies full. My practice has been to feed three times a day; in the morning with good hay; at noon with one of the following articles; Swedish turnips, ruta-bagas after January, carrots, oats, Indian meal, cotton oil seed cake, varying the kind given as often as possible according to my supply; at night, a full supply of wood-waxen, as we call the plant which infests our pastures, a species of broom, and which no other animal will eat. This I mow in August, as it grows in the pastures mixed up with briars and every other foul weed. They eat it with a relish and thus convert my brambles and weeds into food and manure. This is my winter treatment, always taking care to keep the flock supplied with water and with shelter. In many years' experience, I have had so few cases of loss from disease, that I should have to put the percentage down to a fraction, too small to be worth mentioning. In conclusion, let me add one word of general advice, in the language of a good practical farmer: 'The secret of raising the greatest amount of produce, whether in beef or in mutton, I believe to be this: that you never ought to allow the animal to be so pinched or starved, that it retrogrades in the least. You should keep it progressing from the first month of its birth, and never let it lose the flesh it has acquired, because if you have an animal losing for one month, it requires another month to make it up, and then a month more to bring it into regular healthy condition.'"

"Sheep dung may be placed with night-soil and hog manure. Sheep may be said to digest better than cattle. They cut their food finer and chew it better; they void thus less vegetable fibre. Their excrement is more converted into geine. Fed on hay alone, their excrement is composed of:

Water	67.9	
Bilious and extractive matter	1.7	
Humus, with slime	12.8	
Hay and vegetable matter	8.	
Silica	6.	
Carbonate and phosphate of lime	2.	
Carbonate, sulphate and muriate of soda	1.6	
		100.00

Others have found,

Water	68.74	
Matter, soluble in water	4.40	
Matter, soluble in alchohol	2.82	
Vegetable fibre	16.26	
Salts	8.13.	
		100.35

The salts were composed of phosphate of lime and magnesia, carbonate of lime, silicate of potash, common salt and silex. The nitrogen is abundant, and the amount of matter containing this nearly three-fifths greater than cattle dung." "Unless moisture is present, sheep dung undergoes but little change."

"It is said that 1000 sheep folded on an acre of ground one day, would manure it sufficiently to feed 1001 sheep, if their manure could all be saved; so that, by this process, land, which can the first year feed only 1000 sheep, may the next year, by their own droppings, feed 1365. So said Anderson, forty years ago. (Rural Essays.) Sprengel allows that the manure of 1400 sheep, for one day, is equal to manuring, highly, one acre of land. This is about four sheep per year. In France, it is allowed that one sheep manures about 10½ feet square of land per night. [Dana's Muck Manual, 4th Ed., pp. 140, 152, 153.]

According to the tables of Boussingault and Poyen, 36 lbs. of sheep manure is equal in value to 100 lbs. of farm-yard manure, of an average quality.

We have attempted in the previous pages to give the data upon which to form an estimate of the cost of sheep-feeding, so far as food is concerned, which every farmer can apply by taking the cost of food in his locality, and the value of manure; the labor, interest, and other expenses attending the care of stock, are easily ascertained. These calculations are obviously necessary, if we seek to farm understandingly, though they are too apt to be neglected. They are such as men engaged in other

business pursuits are daily in the habit of making, a neglect of which leads in many cases to ruin. If a woollen manufacturer is shown a sample of cloth, he can tell, within a few mills per yard, what he can make a similar article for. He counts the number of threads, calculates the weight, the quantity and fineness of the wool, its cost, the labor to be bestowed upon it, and all the other charges. He would not attempt the manufacture of it without all this preliminary study, and he is the best manufacturer who calculates the most correctly. The same rule applies to the manufacturer of mutton and of wool, of beef and of milk, of corn and of potatoes.

One serious impediment to sheep-husbandry in this State has been the havoc committed upon flocks by dogs. The returns which this Society have received, universally ascribe as the reason why more sheep are not kept, on account of the injuries inflicted by dogs. We are glad, therefore, to congratulate the farmers of Massachusetts that a law has now been passed, which creates a fund out of which to indemnify sheep-owners against loss and injury from this cause. The present law has been in operation but one year, and its good effects are already visible in the increased numbers of sheep. Few persons* are aware how destructive dogs are in this respect, and they are generally of a worthless kind, which are driven from necessity to destroy sheep, in order to obtain the means of existence. The effect of the present law, by imposing a tax upon the animal, is to destroy that class; and the tax, though small, is quite sufficient to cover the losses by those which are left. The provisions of the law are such that it is easy of enforcement, and we hope every farmer in the State will interest himself, in seeing that it is executed in his own neighborhood. The difficulties which beset the cultivator, especially in populous neighborhoods, are quite enough from depredations and trespasses of various kinds, without being obliged to watch his flocks by day and

* The official returns from the several counties in the State of Ohio, for 1858, show that the total number of sheep killed by dogs, was.....60,536
Total number injured by dogs.....36,441
Total damage to sheep by dogs, $148,748.00.

night; losses of this nature can only be guarded against by a law of the description which has lately been enacted.*

The first question usually asked by the farmer who is about to commence sheep-husbandry, is, "What is the most profitable sheep for me to keep"? This is to be determined in ordinary cases, by the soil, climate, and market. For instance, the same course of husbandry and the same kind of sheep would not be advisable in Massachusetts and in Texas,—the latter, thinly populated, with a distant market or perhaps none at all for mutton; the former, thickly settled and with a ready market for both mutton and wool. So, too, there are local causes affecting single farms, which have their influence in determining what kind of sheep should be put upon it. A rough, hilly farm, with a small extent of arable land in proportion to the pasture, is better adapted to a small, hardy race of sheep; while one which has better pastures and higher cultivation can maintain profitably a larger meat-producing breed. We can only lay down some general rules which may aid the farmer in coming to correct conclusions in selecting his flock.

In Massachusetts, there is a certain and ready market for both wool and mutton, and our soil and climate seem to be well adapted to all the usual breeds of sheep; there is nothing, therefore, which stands in the way of our producing good wool and good mutton. Under these circumstances, we have no hesitation in recommending to the farmer, in selecting sheep for his farm, to take those which combine in the highest degree these qualities. The Cotswold, the Leicester, the Down sheep, and the various crosses of the Downs, are all of this character. Nor is it necessary, in order to have a good flock, that they should be pure-bred animals. On the contrary, if we were called upon to make up a flock of sheep, we should select vigorous sheep of good size, with heavy fleeces, of as uniform character in these respects as possible, and breed from them, by using a pure-bred male of any of

* From returns received from all the towns in the State, except *Beverly*, *Somerville*, *South Reading*, *Granby*, *Tolland*, *South Scituate*, and *Kingston*, it appears that 32,707 dogs were licensed in 1859, paying a tax of $35,894. It is estimated, that nearly an equal number were destroyed by their owners, as not being worth the tax, and that as many more escaped taxation altogether.

the breeds we have named, that we wished our flock to be aassimilated to. By pursuing this practice for a few years, and selling for mutton such as did not come up to the desired standard, a flock would soon be formed, containing all the essentials of a breed.* Sheep can be selected that will shear five to six lbs. of wool, worth thirty-five cents per lb., whose lambs, if dropped in March, can be made marketable at $5 per head. Animals of this character, farmers cannot lose money upon.

In conclusion, we would express the hope that more attention will be paid to sheep-husbandry throughout New England, for there is no animal, we are confident, which will repay so well the attention of the farmer. To use the language of Mr. Grey, at the Hexham Farmers' Club, in England: "The wealth and success of a farmer may be pretty well calculated by the amount of his sheep stock. Sheep are said to be the animals with the golden hoof; they enrich where they go. They not only enrich the master, but the soil. Their manure has a peculiarly efficacious quality, and it is distributed throughout the land in a way, very different from that which is left in patches by horned cattle; but there is this also, that while you have the mutton, probably as valuable per pound at the end of the sheep's life as beef, it has given you, year after year, the fleece, which is of itself so important, and which in the progress of manufactures in this country, I think we have no reason to fear ever seeing again at a disastrous price."

Agricultural Education.

Agricultural Education, by Mr. French, which forms a part of this number of the Transactions, well deserves a careful perusal by every one who feels an interest in the promotion of agriculture. It is curious to observe how a necessity always calls forth, as it were simultaneously, an expression of opinion strong enough to induce action upon every subject which affects the public weal. We have arrived at this point: agriculture,

* For breeds of sheep and their management, see the American Shepherd, by L. A. Morrill, an American work of much practical value.

as an art or a profession, has in this country fallen behind other industrial pursuits, while it is admitted that it should take precedence of all others; the social, moral and political well-being of the country is seriously affected by the present low state of our agriculture. A remedy is sought for, and means are to be discovered for curing that greatest of all evils which can afflict a nation, — the deterioration of the soil and the diminution of its agricultural prosperity.

We can hardly find an agricultural newspaper that does not touch upon it; the addresses at our agricultural meetings are filled with the importance of doing something to improve the practice and science of agriculture. Perhaps no better service to the cause of "promoting agriculture" could be rendered than to put upon record the various movements which seem to be simultaneously making, to make American husbandry what it should be — equal, if not superior, to that of any country in the world.

We cannot, however, for want of space, do more than to speak of the effort now making, by systematic education, to advance the prosperity of the farmer. We will barely allude to the formation of farmers' clubs, to the establishment of market-days, to the circulation of information by means of tracts on agricultural subjects, throughout the State, as evidences that public attention to the subject is fully aroused. Elementary education for those who are to become farmers, is absolutely necessary to make all our other efforts fully successful. This subject has lately occupied the attention of the State Board of Agriculture, and a plan or system of agricultural education, commencing in the common schools, was almost unanimously recommended at its February meeting.

This subject, we are glad to notice, is also occupying the attention of our neighboring State, Maine. The Secretary of its Board of Agriculture concludes the Transactions of 1859 with a very able essay on the necessity of agricultural education, and especially of an early acquaintance with agricultural chemistry, which is daily adding to its influence and importance in regulating the operations of the farmer. "Whether," he says, "we kindle a fire on the hearth, or burn a coal-pit, or get up a gen-

tler warmth to forward tomato plants in a hot-bed; whether we bake bread, brew beer, make soap, pile a heap of compost, or cock up hay, we bring into play laws of chemical action, *and he who best understands these laws can best control their results to a profitable issue.*"

The same intelligent writer, in speaking of the method of instructing those who are to till the soil, in the laws of chemistry, physiology, and botany, so needful to the farmer to know, says:

"Until more fully advised regarding a distinct institution for teaching agriculture, I would incline to favor the introduction of the study of natural science into all the schools now existing of a grade high enough to warrant such an introduction; the extent and thoroughness of the instruction to vary according to the grade of the school. To the more advanced classes in our district schools enough might be imparted to draw attention to its importance, and to awaken an interest regarding the wonderful objects and operations of nature by which pupils are daily surrounded, and to excite the desire for further knowledge. The introduction of these studies into our common schools would soon grow up a class of men, imbued with new and enlarged views and realizing the necessity of such an education."

In conclusion, he says:

"To the question, 'What further means can be adopted for the promotion of agriculture?' a very brief and comprehensive answer might be given. Educate the farmer. His education, it is true, may never be finished at any school of man's making, but the youth may, at least, be taught to appreciate the value and to feel the necessity of a knowledge of the principles which alone can safely guide his practice. He may be taught to *commence study*, so that afterwards, while his bodily powers are engaged in daily toil in the great laboratory of nature whence his support is derived, he may, with only the aid of his own trained and developed faculties, mentally prosecute scientific investigations, which will yield both profit and satifaction."

We believe that the time has arrived when this question of education to the farmer can no longer be left without decisive action, and we feel that we are doing good service to the cause of agriculture by bringing together such expressions of opinion upon the subject as we have met with. We do not hesitate, therefore, to conclude with an extract from the address of the Rev. Dr. Stebbins before the Middlesex Agricultural Society in September last:

"Till farmers and mechanics understand this honorableness of their calling, and vindicate it, they will be held in abeyance; and the man who killed Tecumseh, or has shot a Mexican, or captured a squaw and pappoose in the uninhabitable everglades of Florida, will monopolize the admiration of the people, and march amid deafening plaudits, under clouds of banners, to the presidential mansion. The apprpropriate and important question to be asked and an-

swered to-day is most obviously this:—How can farmers and mechanics evince and vindicate their right to be classed among the honored and honorable of the earth? How can young men and young women be convinced that it is as respectable, and far more profitable and prosperous and delightful, to till the soil and manage the dairy and furnish the wardrobe and the table, than it is to sell merchandise and ply the needle, play the exquisite and the belle? The answer is swift and conclusive. These occupations must be raised to the rank of arts by their intelligent, scientific pursuit. The reasons of things must be known, and then farming will be a delight, not a drudgery, an honor, not a disgrace, both in its pursuit and result. How then can this knowledge, essential to the highest success, to any success, in your calling be obtained? In our public schools. I know, as the public schools of the country are usually conducted, little or no attention is paid to practical science. Children are taught to spell Ompompanoosuc, and name the rivers in Ethiopia and Siberia, but they are not taught why a silver spoon is tarnished by boiled eggs, or a knife by cutting an apple. They are not taught why deep plowing prevents the severities of drought, or why guano is a good fertilizer on some soils, or whence comes the carbon of the forest trees. They are not taught the difference between boiled and roasted meat, and why bread is heavy. Silver dollars are put into the churn to bring the butter, and pork is killed at high tide or full of the moon, to prevent shrinkage, because our schools spend more time in teaching the extraction of cube roots than the extraction of butter from cream. The science of cooking, on which health and life depend, is not taught, but algebra is. So our young wives prefer boarding to housekeeping, since they can work quadratives, but not the kneading trough; they can explain the binomial theorem, but not the nature and action of yeast. It is no fault of theirs. It is the fault of the system. Our modes of education are defective, and need renovation. Boys and girls should be taught in school the science of agriculture and cooking, as they are now taught arithmetic and grammar. They should understand from germination to maturity the process of growth and the food of every crop, every vegetable raised. Its parts and the uses of each part in its growth should be known to them as well as the uses of the parts of their own bodies, — their hands, their feet, their eyes, their ears. They should know, moreover, all the weeds on the farm, their character and relative damage to crops, and how to exterminate them. These subjects should be thoroughly taught and illustrated in their schools. The young mind thus becomes interested in future pursuits, and enters upon them not as a task but as a pleasure. Labor thus becomes a profession, not a servitude; it becomes attractive as any other art, more than many now sought for. Botany, or the study of plants, grains and vegetables, should be a prominent study in our common schools; commenced with the alphabet, and continued to graduation, so that every boy and girl fourteen years of age can not only tell the growth and food of every grain and grass and vegetable, but also just what soil and season and fertilizers are best for it. Chemistry also should be studied from the earliest period till the latest, as we now study arithmetic and geography. It is vastly more important to a person to know the prime gases than the prime numbers; the circulation of oxygen is something more necessary to be understood than the circulation of decimals; and unlike fractions, many persons reduce their farms to the lowest terms because they *haven't learned*

how to do it. Chemistry should be studied till the composition of every soil and its adaptation to grains and grasses and vegetables is understood just as well as the adaptation of the stomach of the horse, the ox, the camel, the fowl, to their different kinds of food and methods of digestion, is understood.

"The scholar should know what wheat eats, and how to supply it with food, just as well as he knows what an ox eats and how to feed it. He should know the different diet of the potato, and how to feed it, as he knows the different diet of the cat, and how to feed it. The cat does not live on grass nor the ox on mice. Wheat and potatoes do not eat precisely the same food, yet who thinks of preparing the field for the wheat differently from that for the potato, as he would prepare differently the stall for the ox and the dish for the cat. Taste of the quince and the pear, have they not fed on different food? Do not asparagus and squashes demand different diet? All this and much more children should be taught in our schools. Then, when they go upon the farm, it will be with the curiosity with which the chemist enters his laboratory; not simply to see how much money they can get, but how much they can enjoy and discover.

"I press this point. Our system of common-school education is seriously, not to say radically, defective in this respect. Arithmetic, geography, and grammar are studied to the neglect of other more important and attractive branches of knowledge. Teachers should be trained in our Normal Schools, not in algebra and geometry, only or chiefly, but in botany and chemistry and meteorology. Three hundred and forty-five students were at the State Normal Schools in 1857. Of these, one-half are the sons and daughters of farmers and mechanics, and all are to be teachers in our public schools, the only school which a great portion of the children will ever attend to fit them for the duties of life. The expense of these schools, exclusive of the real estate, is about fourteen thousand dollars annually, and worthily is it applied in spite of the deficiency which I shall name. I find no special statement in the reports, of the amount of time given to the different studies pursued; but in the Westfield School I find botany *optional*, one of the most important studies to farmers, and also book-keeping. At Bridgewater, the proportion of time given to literature as distinguished from scientific studies, is as three hundred to five hundred; only three-fifths as much time is given to the sciences on which all agriculture and mechanical labor and success are based, as to other studies. Whether botany can be studied, if desired, is not stated. The reports of the schools at Framingham and Salem, give no information respecting their attention to these subjects. This is a serious matter, and deserves of farmers and mechanics close scrutiny. These Normal Schools should be so conducted that teachers will come out from them qualified to teach these branches which will make labor a luxury, and the laborer skilful and intelligent.

"There is much said now-a-days of a farm school for the State. I have but little faith in the result of such great and expensive establishments. They make mostly fancy farmers, and do not help farmers' wives at all in their chemical laboratory,—the kitchen. The principles of farming should be taught in every district school, and fully illustrated in the high school. The management and studies of these schools demand the attention of the thoughtful of all classes. They absorb nearly or fully one-third of all the moneys raised for school purposes, in many of our towns, (and wisely, if it is rightly expended,)

while the scholars in attendance are less than one-tenth of the school population. And more important still is the fact that sometimes nine-tenths or more of the scholars in attendance, are spending two-thirds of their time on studies which are of no value in practical life.

"Our high schools are now often conducted as if the scholars of New England were residents of ancient Italy, and cattle were to be reared and crops raised with Virgil's Georgics and Bucolics as a hand-book. The housewifery of our daughters is taught from the domestic economy of Dido, and their delicacy beautified and their modesty perfected by mining syllable by syllable into the story of her shame! Boys who are fitting to be builders, are required to study word for word, the syntax and etymology, and line for line, the construction of Cæsar's bridge, who never receive a word of information respecting the strength of timber or the names of the parts of an ordinary dwelling! Young aspirants for political honor, ardent to become selectmen, assessors, school committees, possibly representatives to the great and the General Court, are thoroughly drilled in the municipal regulations of Rome, and thumb out of their dictionaries with perspiring agony and muttered execrations, the majestic utterances of Cicero against Cataline, when they know nothing of the duties and responsibilities of a field driver, or that such a speech as that of Webster in reply to Hayne, is in existence. It is true that the law requires schools to be kept in towns containing five hundred families, in which Greek and Latin can be taught. But it by no means requires that all the scholars who attend these schools thall study them. And it is hardly just to ruin the practical education of nine-tenths of the scholars, for the sake of fitting one boy or ten for college. The education of the scholars in our public schools should be such as to make intelligent men and women in the great industrial departments of life. Farmers and mechanics look to it, that your schools do this work for which they were established; then agriculture and mechanics will be arts, not drudgeries."

MASSACHUSETTS SOCIETY FOR PROMOTING AGRICULTURE.

Premiums for experiments with manures.

$100 1st Premium.
75 2d do.
50 3d do.

"Select a level piece of land of any convenient size, from twenty square rods up to as many acres or more, which should be as nearly equal in its character and condition as possible. Divide it into five equal parts, numbering them 1, 2, 3, 4 and 5, for a rotation of three years.

"Divide the manure which it is proposed to apply, and which should be of a uniform character, into four equal parts. At the time of first ploughing in the spring, spread evenly one-fourth of the manure upon plot No. 1, and then plough the whole field of an equal depth. Apply another fourth part of the manure to plot No. 2, and then cross plough the whole field to about half the depth of the first ploughing. Spread another fourth of the manure upon plot No. 3, and harrow or cultivate the whole field; after which sow or plant the whole evenly, with any crop preferred. Finally, spread the remaining quarter part of the manure upon plot No. 4.

"Observe that by pursuing this course, each of the five lots will receive equally a deep ploughing, a shallow ploughing, and a harrowing or cultivating, the only difference in them being that in No. 1 the manure is buried deep, in No. 2 shallow, in No. 3 buried only slightly, but coated with loam, and in No. 4 left exposed upon the surface; while No. 5 gets no manure. The manure is to be spread broadcast and as evenly as possible. The after cultivation should be the same on each of the lots, and the harvest of each should take place at the same time.

"Let a statement of the character of the soil, whether light or heavy, dry or moist, leachy or retentive of manures, the crop of 1859, kind and amount and mode of application of manure in 1859, size of field covered by the experiment, depth of first ploughing, kind and amount of manure used in 1860, kind of crop, when and how sown, number of times and manner cultivated, and weight of product on an average rod of each plot be made in 1860, and returned in the annual report of each Society.

"If there is a double product, as grain and straw, corn and stover, let the weight of the secondary product be given on each plot.

"If the competitor weigh the whole crop instead of estimating it by an average rod, there will be no objection to such a course.

"A brief synopsis of the weather for each of the following months. by dividing each month into three parts, and using the terms dry, moist, and wet, to indicate the general character of the weather, will also be expected.

	FIRST THIRD.	MIDDLE THIRD.	LAST THIRD.
MAY,			
JUNE,			
JULY,			
AUGUST,			
SEPTEMBER,			

"A similar report of all the above items, except the nature of the soil, will be made in 1861, and in 1862, when the premiums will be awarded. No manure is to be applied to the second and third crop."

The above premiums are open to competitors throughout the Commonwealth. Competitors for premiums offered by other agricultural societies are invited also to compete for the above, the same experiments serving for both, by filing a duplicate statement with the secretary of this Society.

In awarding the premiums, all other things being equal, preference will be given to those which are tried on the largest space of land, and also where the competitor weighs the whole crop, instead of an average rod. Notice of an intention to compete must be given to the Secretary of the Society on or before the first day of January, 1861, with the statement required in the terms of the premium.

RICHARD S. FAY,

Sec'y Mass. Soc. for Prom. Agriculture.

TRANSACTIONS

OF THE

MASSACHUSETTS SOCIETY

FOR

PROMOTING AGRICULTURE.

NEW SERIES,

Vol. 1:

PART III.

BOSTON:
GEO. C. RAND AND AVERY, PRINTERS,
NO. 3 CORNHILL.
1861.

TRANSACTIONS

OF THE

MASSACHUSETTS SOCIETY

FOR

PROMOTING AGRICULTURE.

NEW SERIES,

Vol. 1:

PART III.

BOSTON:
GEO. C. RAND & AVERY, PRINTERS,
No. 3 Cornhill,
1861.

OFFICERS AND TRUSTEES

FOR THE YEAR

1860.

PRESIDENT:

GEORGE W. LYMAN.

FIRST VICE-PRESIDENT:

THOMAS MOTLEY, Jr.

SECOND VICE-PRESIDENT:

JAMES W. PAIGE.

TREASURER:

DAVID SEARS, Jr.

CORRESPONDING SECRETARY:

RICHARD S. FAY.

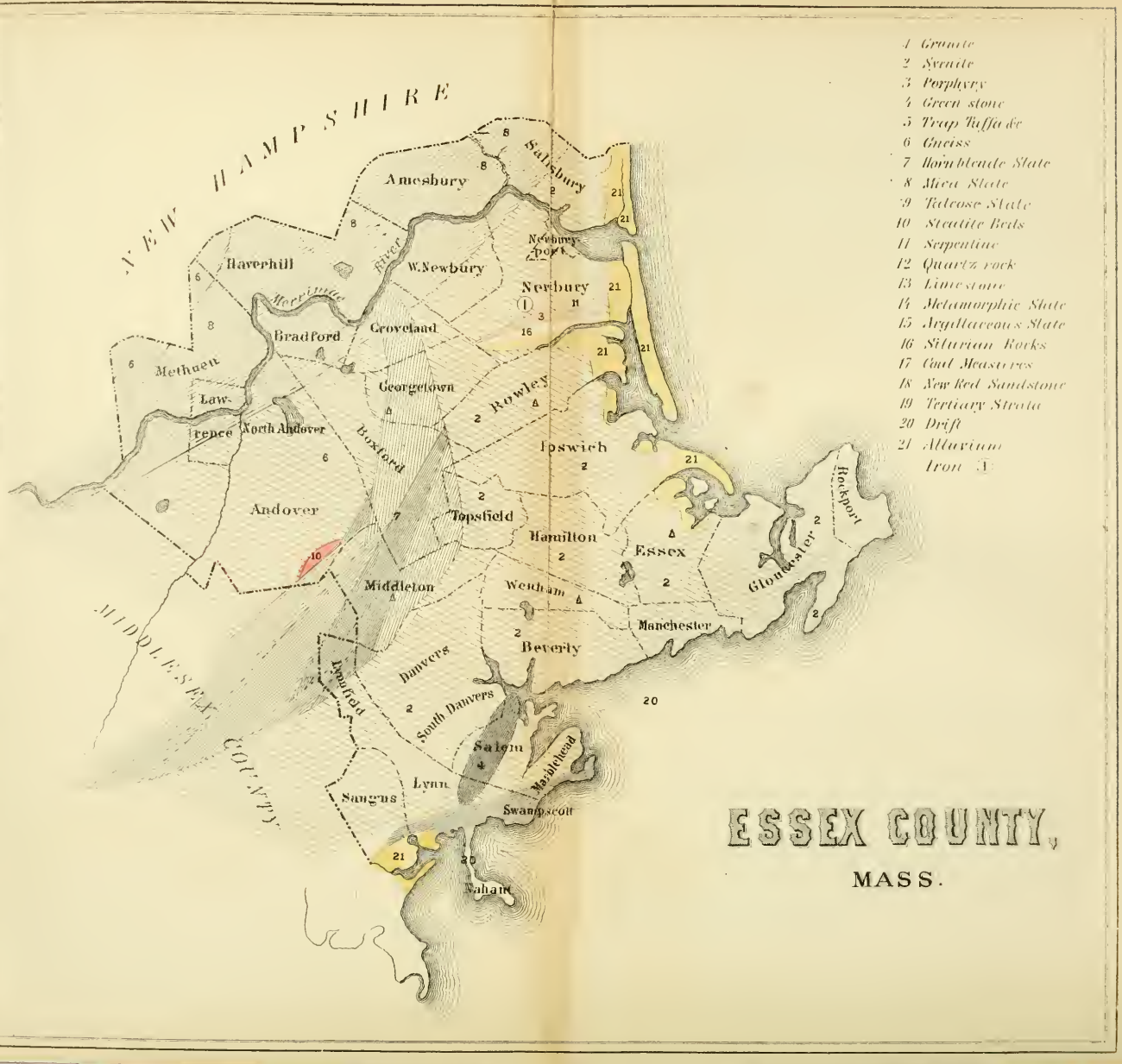
RECORDING SECRETARY:

PETER C. BROOKS, Jr.

TRUSTEES:

ROBERT C. WINTHROP,
GEORGE PEABODY,
GEORGE T. BIGELOW,
GEORGE B. LORING,
MARTIN BRIMMER,
WILLIAM B. BACON.

TABLE OF CONTENTS.


1 Granite
2 Syenite
3 Porphyry
4 Green stone
5 Trap Tuffa &c
6 Gneiss
7 Hornblende Slate
8 Mica Slate
9 Talcose Slate
10 Steatite Beds
11 Serpentine
12 Quartz rock
13 Limestone
14 Metamorphic Slate
15 Argillaceous Slate
16 Silurian Rocks
17 Coal Measures
18 New Red Sandstone
19 Tertiary Strata
20 Drift
21 Alluvium
Iron
NEW HAMPSHIRE
MIDDLESEX COUNTY
Salisbury
Amesbury
Newbury port
Haverhill
W. Newbury
Merrimac River
Newbury
Bradford
Groveland
Methuen
Law-rence
North Andover
Georgetown
Rowley
Boxford
Ipswich
Andover
Topsfield
Hamilton
Essex
Rockport
Gloucester
Middleton
Wenham
Manchester
Beverly
Danvers
Ipswich
South Danvers
Salem
Marblehead
Lynn
Saugus
Swampscott
Nahant
ESSEX COUNTY,
MASS.

TRANSACTIONS.

Agricultural and Geological Survey of Essex County.

By David Choate.

1860.

Its History.

Essex was incorporated as a county in the year 1643. It contains an area of near 420 square miles,* and has a population of 165,602 by the census of 1860. It is situated in the northeast part of the State, and is watered upon two sides by the sea for the distance of about fifty miles. At the time of its incorporation, it consisted of but six towns and two territories; the towns being Salem, Lynn, Ipswich, Rowley, Newbury, Gloucester; and the territories Cochichewic, afterwards Andover, and Enon, afterwards Wenham.

Essex County contains 311,014 acres of land and water within its limits, from actual survey, as returned by town selectmen in the year 1860.

The earliest discovery of any part of Essex by Europeans is stated by Newhall, in his valuable Memorial, now out of print, to have been made by Gosnold, on the 14th of May,

* The length and breadth of Essex County, as laid down in some of the books, vary considerably from the truth. According to Morse's Gazetteer, published in 1797, it is "38 miles long, and 25 miles wide." Mr. Newhall, in his Essex Memorial, published in 1836, makes the same statement, and Barbour, in his Historical Collections, published in 1839, quotes from the others without variation. A territory of these dimensions, it is obvious, would contain 950 square miles, or 608,000 acres. Hayward's Gazetteer of 1849 makes the county contain 400 square miles. This is near the true amount of territory undoubtedly, though it is believed not sufficiently large. The irregularity of the coast makes it difficult to measure accurately. Probably no two surveyors would agree. The above statement, however, of 420 square miles, is believed to be the most reliable.

1602, when, he says, they discovered the coast between Cape Ann and Nahant.

The number of towns is 34. The United States census for 1850 states the number of farms to be 2,708. By the Official Returns for 1860, as published by the State Valuation Committee, 17,727 acres are covered with water, and 9,039 are used for roads. The other divisions of land are as follows, viz: Tillage land, exclusive of the orchards tilled, 17,335 acres; acres of upland mowing, excluding orcharding mowed, 41,124; fresh meadow, 13,947 acres; pasture, excluding orcharding pastured, 94,658 acres; unimproved land, 27,529 acres; salt marsh, 15,826 acres; unimprovable land, 6,734 acres; acres of orcharding of all kinds of fruit, 3,307; acres of orcharding mowed, 1,841. Whole number of acres in the several towns, from "actual survey," 483,015, as published, but really 311,014.

The utter absence of mountains in Essex may be seen in the fact that at no point is there an elevation much exceeding 400 feet above the level of the sea. Thus Legg's Hill, in Marblehead, is but 160 feet high; Rail-cut Hill, in Gloucester, 205; Thompson's Hill, in Gloucester, 255; Prospect Hill, in Rowley, 264; Powow Hill, Salisbury, 328; Ayres's Hill, Haverhill, 339; and Holt's Hill, Andover, 423. Bald Pate, in Georgetown, is one of the high points in the county, but the height is not ascertained. Nearly all these elevations are rounded to the top, and are susceptible of cultivation.

Its Rivers and Ponds.

Bass River is a short stream, but widens rapidly near its mouth. It rises in Beverly, north parish. Its course is southerly, and separates Beverly from Salem, by the bridge, 1,500 feet in length. Until 1668, Bass River was the name of the present town of Beverly. It has pleasant meadows upon its banks.

Chebacco was the Indian name of Essex River. It rises

in several fine sheets of water lying in Essex, Hamilton, and Wenham. From the upper dam to the head of salt water, is about 240 rods, and in that distance the fall is 50 feet, affording several fine mill-sites. Above the upper milldam the stream is sluggish, and flows the meadows a part of the year. After passing the point where it unites with the salt water, it runs through extensive marshes.

Ipswich River, anciently, it is said, was called Great River. It rises, says Dr. Parish, from springs in the west part of Wilmington, in Middlesex. It drains a great extent of land, receiving several tributaries from the north, as well as the Hamilton branch on the south. This latter stream is the outlet of Wenham Pond, and, on account of the small descent, it runs slowly, and overflows the meadows a considerable part of the year. A large part of its course is in Hamilton; hence its name. Ipswich River has four dams, all in Ipswich. The meadows upon this stream, in Topsfield and the westerly towns through which it passes, are spoken of as being "fine," but it is apprehended they would be made decidedly finer by drainage. The cotton factory, operated by this river for a part of the year, contains 3,000 spindles, and consumes 150,000 pounds of cotton annually.

Merrimac River is the father of waters in Essex, for its length and volume. On leaving New Hampshire it first runs into Middlesex County, after which Essex receives it, and conducts it to the sea. It receives several streams, hereafter to be mentioned. This river, as long ago as 1790, had twelve ferries in Essex County. Bridges have long been substituted for most of them.

North River, receiving a part of its waters from Salem, and a part from Danvers, chiefly the former, empties into Bass River between Salem and Beverly.

Boxford and Andover give rise to Parker River, which swallows up Rowley River and a stream rising in West Newbury, called Little River. Parker River falls 50 feet, says Dr. Spofford, in his late Gazetteer, in the course of 1½ miles. Most of the course of this river is in Newbury. It has sev-

eral bridges, the principal being Oldtown Bridge, so called, 850 feet long. It has extensive marshes at its mouth, and empties into Plumb Island River, more properly a sound. The first woollen factory in the county was erected upon this river, and is still in operation.

Powow River rises in Kingston, New Hampshire. Dr. Spofford, in his new Gazetteer, before quoted, states that "the supply of water is not great, but a fall of 70 feet within 40 rods creates very great power." This stream has long been used with success. Dr. Morse, in the first edition of his geography, says it has a descent of 50 feet in 100 rods. It then carried one bloomary, five saw-mills, seven grist-mills, two linseed-oil mills, one fulling-mill, and one snuff-mill. "The dams," he says, "are at short distances from each other; the wheels and mills rising almost immediately over each other." It was upon the Powow River that Jacob Perkins first operated his machine for cutting and heading nails. Mr. Newhall states in his Memorial, before referred to, that "Kimball's Power, so called in Amesbury, is dammed up and converted into a reservoir for feeding the river in times of drought. A part of the canal which forms the communication passes under a high hill tunnel-wise. This tunnel, on account of the very early period when it was undertaken, has always been regarded as an object of curiosity."

Rowley River rises in Boxford, from several ponds. It affords water power for a number of mills, and finally runs through the salt marshes into Parker River.

Saugus River has a meandering course from its origin in Reading into Lynn Bay. The tracts of salt marsh upon this river being chiefly in North Chelsea are extensive; they also constitute about one seventh part of the area of Saugus. The historians inform us that iron works were established upon Saugus River as early as 1645, and that heaps of scoriæ are still to be seen where they stood. Hale also states that "near the banks of this river a band of pirates concealed themselves in the year 1657; they were finally discovered, and three of the four which landed were taken to England and executed."

The Shawshine rises in Lexington and Lincoln, Middlesex County, and enters Essex at Andover. It has a course of more than eight miles in Essex, running the whole width of Andover, then between North Andover and Lawrence, and reaching the Merrimac near Sutton's Mills. This fine stream works 25 sets of woollen machinery in Andover, at Ballardvale and Frye Village, and 23 sets in North Andover. A large part of the 1,259 acres of fresh meadow returned for Andover lies upon this placid stream. It is but 50 feet wide at its mouth.

The Spicket enters the State from New Hampshire, at Methuen. It has a splendid fall of 30 feet in one place, and turns the 5,500 spindles of the cotton mills in that town, after which it runs through Lawrence and loses itself in the Merrimac.

Still other streams belong to the county and might be described, but it is thought unnecessary.

Lakes.

These form an agreeable feature of the county, but a mere reference to them, as originating some of the streams or contributing to them, is all that will be attempted.

Great Pond, in North Andover, which sends out the Cochichewic to the Merrimac, and also Great Pond in Haverhill, with an outlet running northwardly, are splendid sheets of water. Perch, bream, and pickerel may be caught in considerable quantities. "Lake Wenhan," so called, has long been celebrated for its beauty, as well as recently for the purity of its ice. Kimball's Pond, in Amesbury, already referred to, Chebacco Pond in Essex, Middleton Pond in Middleton, Suntaug Lake in Lynnfield and South Danvers, Wenuchem, Wyoma, and Cedar Lakes in Lynn, with many others, greet the traveller's eye with delightful frequency.

Confidence in the Truths of Geology necessary for the Agriculturist.

By this it is not meant that unscientific men are expected to become familiar with the details of this noble science.

The grand features, however, those in which both geologists and chemists are agreed with perfect uniformity, are to be received, however large the demands they may make upon our credence. Among these features, and foremost of them all, is the fact that all soils were originally rock, and have been produced by its abrasion, disintegration, and decomposition. Other substances, in comparatively small quantities and in different proportions, varying according to the locality, are detected without expensive analysis, as saline, vegetable, and animal. This may be called the first lesson in Geology. The difficulty in receiving it consists in harmonizing this theory of the formation of soils with our ideas of the creation of the world, requiring, as it must, an inconceivable length of time, unless by *miracle*, which idea finds little favor even among Christian geologists.

Geologists teach that *five* of the 434 kinds of simple minerals constitute NINE TENTHS of the crust of the earth; and with the addition of two or three more, the number will embrace NINETEEN TWENTIETHS. With these seven or eight minerals, then, the veriest learner can afford to be patient. And Prof. Adams, State Geologist of Vermont, remarks that one of this small number, to wit, quartz, "constitutes itself nearly one half of the crust of the earth," while feldspar constitutes about one tenth,— a mineral less glassy in its appearance than quartz, and not quite so hard. Limestone constitutes about one seventh; hornblende, one fifteenth to one twentieth; mica, about the same; while talc, chlorite, serpentine, and gypsum, with rock salt and coal, are the only other minerals which form any considerable portion of the earth's crust.

It is usually considered that this crust is of the average depth of six miles, and that with the exception of the granitic

sand and other loose materials constituting the superficial covering, it is composed of solid rocks. These rocks are stratified or unstratified; the former being deposited from quiet water in their layers of mud, sand, gravel, &c. and, according to Adams, have since become solid by the agency of heat, pressure, cohesion, &c.

Dr. Hitchcock, in his "Religious Truth illustrated from Science," remarks as follows: "All observation teaches us that man was one of the last of the animals that was placed upon the earth. In vain do we search through the six miles of solid rocks that lie piled upon one another, commencing with the lowest, for any trace of man. And it is not until we come into the uppermost formations, — that is, the alluvial, nay, not until we get almost to the top of *that*, — that we find his bones. And yet these, being formed of the same materials as the bones of other animals, would have been as certainly preserved as theirs, in the lower rocks, had he existed there." His next remark may as well be added, that "at least five vast periods of time, with their numerous yet distinct groups of organic beings, passed over this globe before the appearance of man. This is not a dreamy, hypothetical conclusion, but a simple matter of fact, which has been scrutinized with great care, and by some unfriendly to revelation, and who would gladly have found it otherwise."

It is not proposed to generalize further. Indeed, but for the purpose of erecting the superstructure, most of the above foundation remarks might have been spared.

Its Geology.

Of this it may be said, with even more truth than of Middlesex, by the learned author of its Agricultural Survey, Dr. Reynolds, to wit, that "it is not strongly marked by any peculiar characteristics. Indeed, the only peculiar feature. . . . . is the absence of any marked feature."

The rocks underlying the Essex soil are of the primitive formation, exhibiting no organic remains, being chiefly granite, sienite, gneiss, porphyry, and schist, or those of a slaty character. In this respect it nearly resembles the structure of the Island of Jersey, one of the English Channel Islands, and one of which, for the encouragement of Essex farmers, it may be said, on a high authority, that "IT SUPPORTS TWO INHABITANTS TO EVERY ACRE." And further it may be said, that while Jersey is surrounded by the sea, that storehouse for man, daily supplying his table, and as abundantly supplying his fields with the richest manure, yet the County of Essex has more seashore than Jersey Island, and may derive from the sea a good proportion of all the aids to the support of our population that that celebrated island affords.*

Rocks of the character above mentioned, as found beneath our soil, or cropping out at frequent intervals, generally yield, as the chemists inform us, about 66 per cent. of silica, 6 or 7 of potassa, 5 per cent. of oxide of iron, with the balance of lime and magnesia. But for diluvial action, the soils might be expected to correspond with the rocks underneath. Geologists are agreed, however, in saying, that all the loose covering of the rocky formation has been removed from the parent rock in a southerly or southeasterly direction, in many cases for several miles. This fact makes an analysis of the parent rock comparatively unimportant in determining the nature of the soil in a given place. Had no drift-period ever occurred in the world's history, it is evident the soil would have been coincident with the rocks; or had the removal of the detritus always been uniform in regard to distance, then, when cultivation had produced no changes of the soil, the parent rocks would have afforded a true index to the upper strata. Or,

* A writer stated in 1808, "that the cultivation of apple-trees for cider in the Isle of Jersey had occasioned a deficiency of arable land, the enormous quantity of 24,000 hogsheads being made annually, upon a spot containing less than 29,000 acres. Undoubtedly many of the islanders live in a manner we should call comfortless. It is interesting to learn from recent authority that the apple-trees are giving way to crops of grain, grass, and roots." But beyond all controversy, Essex County is capable of supporting a population far outrunning the present.

again, had the earthy covering been removed no farther than the boulders, the geological character of the latter would have been identical with that of the former; but even that is seldom the case. The result must be, that our soils have been compounded of the different rocks lying a few miles, more or less, northerly or northwesterly of a given point.

The absence of any considerable deposit of limestone in the county is the unvarying remark of all geologists. Newbury contains the only trace of that valuable rock at present known, except still slighter ones on the east side of Nahant; and even these are too impure to admit of obtaining blocks of any size for valuable use. Asbestos, serpentine, and amianthus, are found intermixed with it in that curious cave described by naturalists under the forbidding name of "Devil's Den." *

The towns of Essex that exhibit gneiss as the leading rock upon the geological map, are Andover and North Andover. Traces of it, however, are found in Haverhill; in Boxford, it exists largely; and in Methuen, in perhaps one twelfth part of the town. Sienite and greenstone trap are the leading rocks in Beverly, Lynn, and part of Danvers; sienite in Essex, Georgetown, Gloucester, Groveland, Hamilton, Ipswich, Lynnfield, Manchester, Marblehead, Nahant, Newburyport, Rockport, Rowley, Salem, Salisbury, Saugus, South Danvers, Topsfield, Wenham, and Newbury.

Dr. Hitchcock found graywacke in Newbury and Rowley; mica slate in Amesbury, universally over the town; in Bradford, largely or wholly; in Methuen, extensively; and a portion of Salisbury and West Newbury was pervaded by it. Hornblende slate was detected by the same eminent geologist in Boxford, Georgetown, Groveland, in Middleton universally, and in Topsfield largely. Porphyry was discovered by the same gentleman, while exploring the State, in Lynn, Marblehead, and Swampscot. Allusion has before been made to limestone in Newbury, and it may be added that iron

* Mr. Prescott, however, says fibrous, ligniform, and compact *asbestos* occurs also at Nahant.

gives evidence of being present there to some extent. There is also a deposit, it is believed, of iron of great purity, in the town of Essex. No exploration has been yet made, but the effect upon the magnetic needle is without a precedent, as it is confidently believed, viz: such as to deflect the needle 72° in a distance of four rods. The deposit must therefore be greatly concentrated. It may prove to be a combination of minerals of very little value, yet of such qualities as to produce the effect described. Its power exceeds that which was found by Dr. Hitchcock, at Canaan Mountain, in Connecticut, and which he describes in Silliman's Scientific Journal, but which deflected the needle only 50° or 52° in a distance of ten rods, but which he nevertheless supposed to be iron ore of sufficient purity to pay well for exploring.

The deposit of porphyry in Marblehead deserves more than a passing remark. The following description of it has been kindly furnished by the learned geologist of Marblehead, J. J. H. Gregory, Esq.

"The porphyry occurs under three varieties, as regards the structure of the deposit, viz: in ledges having a cleavage tendency, but only developed so far, while in process of cooling, as to shatter the rock into small angular pores, whose angles roughen the surface as though studded with spikes. . . . . A second form of deposit presents the cleavage planes so far advanced that perfect rhomboids are not unfrequently met with. Southeast of the lighthouse, well jutted into the sea, occurs a ledge of the second form of deposit. The third form of deposit occurs in slabs of exquisitely banded or watered porphyry, which, with a thickness not usually exceeding two or three inches, overlie each other, forming a bed which makes an angle of about 30° with the horizon. Probably the finest specimen of this structure is the bed that outcrops along the shore, a few rods southeast of the wharf of Ephraim Brown, on the harbor side of the Neck. Beautiful pebbles of the banded porphyry may be found on the sea-beaches of the Neck. The ledge is well worthy the attention of those wealthy amateurs, whose tastes,

sustained by ample means, look across the water to the ornamental stones of Europe for decorations to their dwellings. A mantelpiece made of banded porphyry would be unique, and would draw more attention than all the verd antique in Boston; and, for aught we know as yet, its inherent beauty would sustain the curiosity that the rarity had awakened. When will the man of wealth and taste appear, who, standing head and shoulders above the crowd of weak imitators, will exhibit to admiring friends, instead of the foreign marble, tables of mosaic made from the serpentine of Newburyport, the marbles of the western sections of the State, the tourmaline rock of Chesterfield, the beryls of Royalston, the porphyry of Marblehead and Lynn, and the various ornamental rocks which occur in his native State?" *

It is the opinion of many modern geologists that sienite is the genuine term for much that formerly took the name of granite. Indeed, Mr. Prescott, who wrote a sketch of the geology and mineralogy of the southern part of Essex County a few years subsequently to Dr. Hitchcock, declares that no bed of granite occurs in the southern section of the county! He found only a few scattering boulders in Lynn and Saugus, and these he traced to their beds in Boxford, where, by the by, Dr. Hitchcock, according to his map, found only hornblende, slate, and gneiss.

A bed of sienite, said to differ considerably from the great mass of the same rock pervading the body of the county, found crossing the southern part of Danvers and Lynnfield with the northern parts of Lynn and Saugus, has been somewhat extensively quarried. It makes superior millstones. It extends no further north than Procter's Brook, nor southeasterly of Tapley's Brook. The width of the bed, Mr. Prescott informs us, does not exceed three miles, "forming, in many places, high hills of solid rock and craggy cliffs."

A very narrow bed of sienite has been found in Beverly,

* The above graphic description of the geology of Marblehead, naturally suggests the importance of careful attention to other towns. It can hardly be that the objects of geological interest should be confined to that town. They exist everywhere.

beginning, according to the same scientific geologist, near the north end of Beverly bridge, and extending towards the town of Essex. It is but a few rods wide, while you find "greenstone trap prevailing on both sides of the road from Beverly to Gloucester."

Boulders of the Danvers granite already referred to, are found, as might be expected, "in Salem and Marblehead, as well as on the porphyry ridges of Lynn and Saugus," also, it is said, as far as Nahant, and even Little Nahant.

A rock of some interest has been found in the towns of Topsfield and Middleton, of which the most abundant ingredient is feldspar, and seems unlike any other in that section of the county. It is said to contain no hornblende, but in place of it you find green chlorite with quartz. Although this deposit is of interest to the geologist, as being peculiar to itself, it does not seem entitled to special interest in an agricultural point of view, the yield of Indian corn in Middleton being but 25 bushels to the acre, and in Topsfield but 29½ bushels.

Greenstone trap is found extensively in several towns in Essex south. It is seen near the porphyry sections of Lynn and its neighbor, Saugus, and keeps company with the sienite ledges of Danvers and Lynn, of Saugus and Beverly. Dr. Prescott observed dikes of fine-grained greenstone or trap, from one inch to forty feet in diameter, traverse the State, and sienite in every section of Nahant and Beverly, as well as in Salem and Marblehead, though the greenstone became coarser in the two latter towns.

The dividing line in Lynn, between the gneiss on the northwest side and the sienite on the southeast, is supposed to be a bed of magnesian or serpentine marble. It is from three to five miles long, and a quarry in it was opened near the centre of the town some years ago. When first quarried, we are told, it can be cut with a saw or turned with a lathe, though requiring to be dry by exposure to the air to take a good polish.

It has, from the beginning, appeared to be one of the leading objects that should press upon the attention of any one

making a geological survey of Essex, to discover, if possible, the means for improvement in agriculture. Has nature deposited manures of any kind in our soil, or under it; and if so, where? The sea-fund is of course restricted to those living near it. Does the land contain any stores not yet discovered? anything at hand, — anything open to all? We believe in deposits of guano, a rich and powerful manure; but Ichaboe and the Chincha islands are a good way off. We hear of the powerful effects of green-sand in New Jersey, and a writer in the Journal of the Royal Agricultural Society of England complains that "the Americans, in the course of the year 1858, quarried away the greater part of an islet called Sombrero, and sold the substance in New York to the amount of £100,000, for the purpose of regenerating the exhausted soils of Virginia." All this is interesting as showing deposits of manure somewhere; but is there anything at home?

Marl.

"No form of calcareous matter is so valuable in agriculture as marl." Dr. Hitchcock says "that from the nature of our (Massachusetts) rocks, he had no hope of finding rich marls in any part of the State, except the County of Berkshire." The theory of this learned chemist is, that Berkshire marls are formed from "the carbonate of lime, brought into ponds, and then at length deposited. After the pond is filled nearly up, vegetables begin to grow over the marl, and thus at length a deposit of peaty matter covers the marl." This agrees with the observations of others, to wit: that all marls underlie strata of peat or muck. If all marls are formed in this manner, then it is, perhaps, useless to search further for them in Essex County. There is, indeed, a substance resembling it in many places, which, on examination, proves to contain no lime at all, while in color it strongly resembles it. This has been found in the central and eastern parts of the State.

Mr. Gregory, of Marblehead, has discovered a deposit of this substance in that town, but remarks that the qualities were silicious and not calcareous. There is another deposit upon the farm of Joseph How, of Methuen. A small quantity sent me by Mr. How, under the action of muriatic acid, shows no lime at all. It is important, however, that this article should receive more attention. Mr. How has applied it to his grass lands with good effect,—a fact so significant that I deem his account of it, communicated under a recent date to me, to be of sufficient importance to make public, as I do, with his permission, reserving, however, the principal part of his letter for another topic, viz: that of peat and peat meadows. "In several cases," says Mr. H., "in and around my meadows, I have dug ditches, two or two and a half feet deep, for the double purpose of underdraining the land, and disposing of small stones. I have spread the subsoil, which in some cases was gravel, others sand, others a marly substance. In every case it has had a wonderful effect on the grass." This substance does not exhibit any carbonate of lime; yet from its *wonderful effects on grass*, it may still prove of great use, especially should it be found in the peat meadows generally. Col. Adams, of Newbury, finds the same thing upon his farm, though its value has not been tested.

Peat Alluvium.

In the utter absence of limestone rocks, from which so much agricultural wealth is derived in other localities, the farmers of Essex naturally begin to turn attention to the rich and extensive deposits of peat. Not indeed *as peat;* for coal, at present prices, is apparently destined to make peat unnecessary for fuel. It long ago excited the admiration of thinking men, as it continues to do, that the accumulated forests of the primeval world should have been changed to coal and laid by for the use of ages then to come. The time is now

come, and the amazing masses yield themselves up, and no anxiety need be felt on account of the waning of the living forest.*

The world's fuel is all provided in our coal-fields, we are told, for a *thousand thousand* years to come. So that the peat deposits may be spoken of as the manure-heap for the upland, as well as for being converted into upland itself. Dr. Hitchcock's Geological Survey of the State, in or about the year 1837, reports but a few deposits in Essex, to wit: in Andover, 2,000 acres, 8 feet deep; in Amesbury, 100 acres, 10 feet deep: in Methuen, 50 acres, 3 to 6 feet deep; in Lynnfield, 100 to 200 acres, 10 to 12 feet deep; and in Rowley, 500 acres, from 3 to 6 feet deep. This learned geologist informs us, indeed, that the "nearly 50 towns" of the State where he found peat, were "by no means all in which he knew it to exist." How much more in the county was at that time known of, does not appear; but later inquiries, and especially the statistics for 1860, have revealed the existence of peat and muck much more extensively. An amount little short of 14,000 acres of "fresh meadow" is returned by the selectmen of the

* A few facts, derived from the statistics of the county, on the subject of our woodlands, as collected by the selectmen of the towns, and returned to the Secretary of the Commonwealth, the present year (1860), lead to an astounding result. Thus, the whole number of acres of woodland in the county is 46,730, and the whole amount of wood growing upon the same is returned as 598,015 cords. The number of dwelling-houses in that county is 22,232, by the same returns. Allow the annual growth upon each acre of woodland to be *two cords*, which is near the amount ascertained by the late Commissioner, Henry Colman, and the yearly addition is 93,460 cords. Suppose six cords of wood to be consumed in each dwelling-house, only, and the quantity consumed for family use is 133,392 cords annually. The yearly growth, as above, viz: 93,460, cords, leaves the amount to be provided for, at 39,932 cords per year. At this rate, the wood growing, viz: 598,015 cords would last only 15 years. Should all the steam power in the county, in addition to this, make its draft upon the woodlands, everything would be swept from them in a short time, to say nothing of the other uses for wood and timber. It appears that the town authorities have estimated the quantity of standing wood at about twelve cords and a half per acre. It would undoubtedly bear to be doubled, or nearly so, and consequently the woods would continue to supply the families with fuel, in the absence of coal and all other supplies from abroad, twice that length of time. As a drawback to this, however, it should not be forgotten that a vast many of the dwelling-houses contain more than one family; and again, there are but few families that do not consume more than six cords of wood per year, and many more than twice that amount.

several towns. At an average depth of six feet, this quantity would contain twenty-eight and one half million cords nearly, an amount sufficient to put 1,000 cords upon every acre of "improved land" in the county. That a large part of these meadows is mud only, there can be no doubt. "I can shake an acre of it," said a farmer in speaking of the Georgetown meadows; and the received opinion of its value will appear from the fact stated by him that "many farmers are in the habit of getting it out in the fall, exposing it to the action of the frost, and in spring of mixing it with stable manure, half and half, and it is then considered as good as the manure of cows."

By far the larger part of our meadows, however, will, of course, remain meadows, and, under an improved husbandry, will become, as most of them are certainly capable of becoming, the very Goshens of the county.

The Essex County's Transactions for 1845 contain a few remarks by the late Gardner B. Perry, D.D., of Groveland, too important to be forgotten, which may, with great propriety, find place here.

"Your Committee would observe that it is their deep impression that one of the best efforts that the Essex County Agricultural Society could make, would be to secure a scientific and practical survey of the meadows of the county. In this way, great and important principles might be developed, much useless labor saved, many disappointments avoided, successful enterprises accomplished with less expense, and the whole labor bestowed on this part of farming be followed by much more encouraging reward. To give a single illustration: Some meadows in this county are flooded with water, which comes in the form of springs from the high lands in the vicinity, and can be easily drained by cutting ditches in the borders.

"Others receive their waters from the springs rising up underneath, and require, therefore, a different process.

"Many are simple basins, having a hard and impervious bottom. They hold the water which is rained upon them, and the little that runs in upon the surface of land around, as water runs into tubs from the roofs of buildings.

"Some swamps, no doubt, are watered by a combination of all these sources.

"Now, how obvious it is that in draining these swamps, a regard must be had to these circumstances! And how few, comparatively, are as fully informed as would be good and profitable for them to be! How could the Society do better than to investigate the subject, and inform the county? A few hundred dollars laid out in such a survey would be followed by manifold more advantages than all the premiums that are likely to be given on reclaimed lands for many years."

Much meadow land is apparently irreclaimable, for want of

a sufficient inclination of surface. This is the case along the banks of Ipswich River, on some parts of which the meadows are extensive. In some cases meadows remote from a fall are subject to flowage, and this sometimes occurs where the owner is controlled in his draining operations by the owners below. In such cases a remedy should be provided by law. Mill privileges indeed, granted by law, are to be respected and held sacred; but a lazy owner of a bog meadow should be compelled to drain his own lands for the good of others, just as the owner of a city house is made to clear the snow from the sidewalks, *pro bono publico.*

The best of land is now lying in our partly submerged meadows, and, after draining, the expense of putting it into a garden state is very small. The carting on of a few loads of soil or loam, or, as some say, even sand and gravel, yearly, in winter, is all that seems absolutely necessary. "I have never seen any garden-spots more productive," says the late venerable Temple Cutler, of Hamilton, "bearing the drought better than upland, and good, even in wet seasons, for vines or roots for culinary purposes."

With regard to peat and meadow mud generally as a manure, it is important to observe that when it has been *recently* taken from the meadow and spread freely upon the soil, it often acts badly, and is said to be sour. An easy and convenient test, in order to ascertain the presence of acid matter, is to dip litmus paper into a solution of it; if the paper is colored red, it shows that the peat or muck is sour.* It may also be ascer-

* This method of detecting the acid of muck will occasion a smile among the scientific chemists, and makes feeble war upon the theory that an analysis of a soil would require "several months." The writer of this essay would yield to no one in respect for scientific chemistry; but at the same time would not hesitate to advise every farmer dealing at all with meadow mud to use the litmus paper for the purpose of ascertaining whether his deposit of muck was impregnated with acid or not. A member of the State Legislature, a few years since, requested one of the most distinguished chemists in Boston to instruct him how to analyze soil. "I will," was the answer, "but it will require an apparatus that will cost you $2,000. Upon these terms, of course, no practical man will be much the wiser. But by the method recommended by Dr. Dana, and approved by Dr. Hitchcock, very much is within the reach of every farmer which it is of great importance for him to know.

tained by the appearance of the stones thrown out of the bogs. Dr. Jackson says, "that all those matters which acid would attack and dissolve in the bog rocks, are found to have been removed; every trace of feldspar and mica are found to be dissolved from a piece of granite, and a white silicious skeleton of the stone remains." In all such cases, the peat or muck requires long exposure to the action of the atmosphere, or, if needed for immediate use, the mass should be saturated with alkalies, so as to neutralize the acid. The precise amount of potash or other alkali cannot be specified with exactness. Till the acid and all noxious salts are destroyed, meadow mud cannot be profitably or even safely used as a manure.

Before leaving this interesting topic it will be proper to review the opinions of Dr. Perry and of Mr. Cutler as expressed on a foregoing page relative to the value of meadow land for cultivation. The Reports of the Essex Agricultural Society, from or about the year 1831 to the present time, show conclusively that improved meadows have succeeded admirably *for a time*, and the Society has paid large premiums for improvements, yet they do not, as indeed they could not, reveal the subsequent history of the meadows upon which the experiments were made. Recent inquiries have led the writer of this essay to question the *permanency* of most of the supposed improvements. Premiums were awarded for improvements made, among others, upon meadows in Lynnfield in 1832, Topsfield in 1838, Wenham in 1850, Methuen in 18—, Salisbury in 1837, Lynn in 1837, in '39, and '55, Saugus in 1838, Lynnfield in 1838, Danvers in 1839 and 1852, Ipswich 1850, Boxford, 1851, Marblehead in 1851, Salem, 1852, Rowley, 1855, West Boxford, 1857.* What is the present state of these meadows? Those of the number recently "improved" have not yet had time to develop themselves. Of all the others, with perhaps one or two exceptions, there is much complaint; and although it is not an agreeable office to attack a popular sentiment, one that has itself become almost an *insti-*

* The Reports of the Society from 1841 to 1850 are not at hand, and the premiums for that time are here omitted.

tution, it is really time to inquire whether there is not some latent fallacy running through the whole idea of improving all bog meadows indiscriminately. The finger of philosophy pointed long and earnestly in the direction of muck deposits as the great panacea for our hungry fields, and they have no doubt furnished the absorbent for barnyard manures from time immemorial. As long ago, however, as 1750, the attention of farmers began to be turned in another direction, viz: that of cultivating the deposit itself. Bishop's meadow in Danvers was ploughed about that time, says Mr. Wm. R. Putnam, in his valuable report made in 1857. "And for some time," says he, "it yielded large crops." It is true that some of these meadows now owned by George Peabody, and upon which "large quantities of gravel had been spread," and which have, no doubt, received such attention as none but rich capitalists are able to bestow, although reclaimed "more than 40 years ago, continue to produce large crops of hay." This, however, appears to be the exception and not the rule; and Mr. Putnam himself says, "If we cannot drain the stagnant water from the meadow, it is not desirable to attempt to reclaim it." Most meadows, it is believed, are in this situation, that is, incapable of drainage without great expense. But what seems to have been nature's design in storing away these rich deposits? Analogy answers at once, that they might be diffused as the wants of man require. Why were the world's primeval forests made into coal and laid away? Not to be burned in the mine, certainly; and it would be hardly less absurd to talk of appropriating all the wealth of the muck-bed where it lies. Scientific Agriculturists seem to have thought of no other use for the wealth of the muck-bed than to apply it to upland soils. "I am convinced," says Dr. Hitchcock, "from all I have seen and heard, that Massachusetts contains enough of this geine and vegetable fibre in her swamps to render all her fields fertile for centuries."

Mr. Alonzo Gray, a distinguished chemist, now deceased, says: "These unimprovable lands, as they are styled, contain manure enough in some sections to cover all our tilled lands

a foot deep; manure enough to render every acre of the soil as fertile as the prairies of the West; manure enough to raise two tons of hay to grow, where now grows but one, and an equal increase in all the other productions of the farm." No intimation is here given that improvement of the meadows for cultivation was even contemplated.

What has experience taught upon this subject in Essex County? Mr. W. R. Putnam, above quoted, says of Bishop's meadow, which was reclaimed, "for *some time* it yielded large crops." The Committee of the Society in 1850, in speaking of Mr. Locke's meadow, intimate the early decline of it by saying: "This being the third crop of hay since the land was reclaimed, the quality probably was not quite so good as the other two years; some natural grasses were mixed with the English,"—that is, it was better the first and second year than the third.

The Society's Committee for 1853, though somewhat sanguine in favor of reclaiming meadows, when speaking of the importance of thoroughness in spreading gravel and other materials from the upland upon the surface of the meadow, say, so much must be put on as will "forever remove the meadow character of the land," for the reason that "we have more than once seen meadows pretended to be reclaimed, that would not stay reclaimed."

It is instructive to notice the change in public opinion which has taken place since the County Society commenced its system of encouraging improvements in meadows. The above extracts show something of it; but the following extracts from letters of very recent date, from distinguished farmers and others in the county, are outspoken, and may prove of great value.

From Mr. B. F. Newhall, of Saugus:—

"My neighbor and townsman, Jonathan Newhall, has just put into my hands a letter from you, inquiring about some reclaimed meadow lands, and wishing me to answer it for him. I am well acquainted with the lands to which you refer, and with all that has been done upon them, and will proceed to give you their history as they have received my observation.

"The land of T. H. Brown was three or four acres of boggy swamp, on which

formerly was a heavy growth of wood. The bog of this swamp is of great depth, and filled with fallen logs. Brown lowered the water, and cut up and burned the hassocks and rubbish. He took out, also, when doing it, a great many cords of logs. He spent upon this piece of land a large amount of hard labor, and increased the debt upon his small farm about $1,000, in doing it. He teamed upon it a large amount of gravel and sand, and prepared it every way in the most approved manner. For two or three years it did tolerably well, but did not any year come up to the average of tillage land. It suffered from drought much more than any other land. Since he has died, it has not had much done to it, and it has gone back so that it yields but little grass, and that very poor. From the best observation I can make, I pronounce it a failure. It has never half paid its cost. Its value now must be small."

"The next is William Osborn's. This I know all about. About 1835 to 1838, I bought ten acres of swamp on which was a heavy growth of hackmatack. I cut the wood off, and sold Wm. Osborn about three acres to experiment upon. This was also a deep bog, full of decaying wood. The bog is of great depth, perhaps thirty feet. Osborn drained off the water, tore up the stumps, burned the hassocks, and spent upon it a large amount of labor. This for a year or two promised tolerably well, but it soon began to fail. The drought pinched very badly. Osborn owns it yet, and has continued to do a good deal upon it, but it is poor land for anything, and that is the best that can be said of that. I pronounce this an equal failure with Brown's. It has never half paid for the labor upon it."

"I have also another case in point which was never reported: —

"Joshua Howard of Saugus bought of me two acres of the same lot which I sold to Osborn. Howard spent thereon a large amount of hired labor, and put the land in as good order as it could be. The result is the same as in the case of Osborn and Brown. After six or eight years of trial, Howard gave it up, and sold it. Since that time it has been neglected, and is now nothing better than a boggy swamp."

"I have also another case of somewhat different land. I refer to the farm in Lynn, formerly owned by Temple Cutler. Orin Dalrymple bought this farm, and upon it was about twenty acres of meadow. This meadow had a soil about three feet deep upon clay bottom. Dalrymple drained this meadow, and put upon it a large amount of sand and gravel. No pains or expense was spared to put this land into the best state of cultivation possible. While Dalrymple owned it and put upon it an almost unlimited amount of expense, it yielded a large quantity of grass. Dalrymple sold it at high water, and since that time it has run down, so that now its yield is small, and poor grass at that. My own observation has satisfied me in this case, that it cost a great deal more than it was worth. I think it to be a general truth, that all reclaimed meadows have cost more than they have come to. This is true as far as my observation goes."

Room can be made for only one opinion more, that of Mr. John Keely, of Haverhill.

"I have regarded our numerous lowlands as nuisances to be abated, and as furnishing the *means for obtaining large products of grass, and also for enriching our uplands.* In ages gone by, I have considered them as ponds or pools which have been gradually filled up by the accumulation of the finer parts of the surrounding soil,

carried down by rain storms (and possibly more convulsive causes), in a turbid state, and left by the clear water, as it found its outlet, until they have come to the level, or nearly so, of the outlet. If now at this point the mind reverts to what you have very properly introduced into your theory, namely, the *providential design* of this gradual, but sure result of natural causes, I have thought it might fix upon three: first, that by thus changing these pools of standing water into mud deposits, the atmosphere might become more pure, and better adapted to the condition of man. But in order to secure this result, man must co-operate with the great Designer. These lands must be drained, and the remaining stagnant water carried off. Here a *second* providential design might be traced, namely, a new field for cultivation in the midst of our *long-worn* lands, particularly adapted to produce large crops of grass; not, indeed, as some have unwarrantably supposed *without further cultivation*, but with much less of either manure or labor than other lands would require.

"Then as the third point in the design of Providence, I should put what I understand you to consider as the *principal* design, namely, that these deposits should furnish the means of enriching our uplands. Inclining as I do at present to the above view, you will readily infer that I should limit the use of these deposits to such parts as could be removed without reducing them to their former condition as stagnant pools or marshes. All the mud from the ditches, together with a large part of the surface near the outlet, and in some cases all the surface to a considerable depth, might thus be used, either to take first to the manure yards and cellars, or directly to the uplands, to be mixed with the soil in quantities so large as to entirely change the previous character. I have often thought that much labor might be profitably employed in thus *mixing soils;* clay or marl with sand, and sand with clay; mud with gravel, and gravel with mud, &c."

"Mr. Bradly's meadow in Methuen, in regard to which I presented a report to our Trustees at their last meeting, will present a striking illustration of these three views. It is only a few rods from his house, and the family believe that they live in a pure atmosphere; there is a new mowing field of vast productiveness for many years at least; and he is carrying on the manufactory of manure, on so magnificent a scale as to insure the very speedy enriching of all other parts of his farm."

This topic, however, is too important to be disposed of hastily. There are objections to the theory of appropriating the whole mass of meadow deposits for the purpose of manure; not the least of which is, that the reservoir containing the mass, *when exhausted*, would remain a receptacle of standing water, being, when deep, incapable of drainage. Yet truly, with the facts above stated of almost universal failure even though the Agricultural societies smile benignantly upon almost every experiment, a still further and more far-reaching examination of the subject seems to be demanded. I am reluctantly compelled to omit the promised letter of Mr. Howe of Methuen on this topic, and with a quotation of some length

from a letter written by Mr. C. P. Preston, of Danvers, present Secretary of the County Agricultural Society, with a few remarks additional, the subject will be dismissed.

. . . . . "If we were obliged to convert the meadows to but one purpose, or, in other words, if we had not a choice in the matter, either to ditch, reclaim, and cultivate them *where they are*, or remove them to the uplands, there to enrich and fructify those lands, then we might hesitate long in the answer that should be given as to the better mode. Many farmers have meadows that are too shallow to yield much muck; those, of course, they will reclaim and convert into the most productive of grass lands. But others have meadows which are also deposits of the best of muck. Is it not the correct policy in such cases to reclaim, render productive, and gather the crop, while at the same time the "removal of the deposits" may be going forward, enriching the remainder of the farm? And in many cases, a barter trade may be made between the two portions of the farm, viz: sand or loam from the upland spread on the meadows, and the muck which is thrown from the ditches taken in exchange to spread upon the upland." . . .

The "barter trade" requires indeed that a portion of the meadows, it may be a larger one than the foregoing topic has contemplated, should be reclaimed and cultivated where these lands lie; and may the day be distant when the voice of the early presidents and fathers of the county society shall be disregarded in this matter. The judicious reports of such committees as that in 1853, J. W. Procter, Esq. chairman, and many others, together with the brilliant and successful experiments of R. S. Rogers, Esq. and Mr. Page, in Danvers, Mr. Payson in Rowley, Dr. Merriam, in Topsfield, Mr. Ware, in Marblehead, with numerous others, all still point in a direction which shows that the public fancy at least, and perhaps its soberest thought, will finally settle down in favor of reclaiming meadows, and the "barter" consist in drawing a small but wet and heavy load from the meadow to the upland, and a large one back; and if by this process the meadow will but "stay reclaimed," so let it be.

The constantly diminishing richness of our cultivated lands, those constantly cropped and inconstantly manured fields, has naturally turned the public eye to our most extensive meadows as the substitute. The finger of agricultural philosophy is pointing in that direction impressively. A speculation or two upon the topic *of a deep and thorough draining*

effected by law may not be considered out of place. A movement commenced in the British Parliament, on this subject, some two years ago, and is still in progress. It may seem, and may prove hopeless to attempt to lighten the mortmain grasp of an English title. There is something of the nature of the " everlasting hills " about it, and when those hills shall bow, and then only, it may be said, can vested rights be invaded or innocently touched.

But what are the lessons of history in relation to the flowage of lands in Essex County? Briefly, and this is all that can be properly said in a sketch like this, when the Pilgrim Fathers set foot on these shores, the two most pressing wants were *houses to dwell in, and food to eat.* The log-house and the pounded corn kept those alive who lived, but the sight of mill streams which had been running to waste since the beginning of the world soon reminded them of grinding corn and sawing boards. Some of the earliest acts of the General Court were those granting mill privileges. Dams were built at every fall. The virgin acres of the upland fields were so much more than sufficient for the population, that loss by flowage was thought, no doubt, to be the best of all losses. Ipswich River, like many others, was probably considered really improved by the dams thrown across it, and made more "*faire* and delightful," by covering "a most hideous swamp of large extent, even for many miles, being a great harbor for bears." (*See* Fell's History of Ipswich, page 36.)

The query now arises whether changes in society may not some day occur which shall make water power unnecessary? Is not *steam power* already unharnessing the horse and turning him out to pasture? Has it not long since commenced its triumphs on the ice-bound rivers of the New England States, driving the million wheels which would otherwise yield to the icy king for four months in the year? Is there not something unnatural in the idea of even a vested right outlasting the need of that right? What becomes of it in case of a milldam where the river has ceased to run at all, as is already in numerous instances the case? Or of what value

is that dam to the owner, when other power can be brought in to drive machinery so much cheaper and better that the water is not wanted for any such purpose? A change like this, draining the 13,400 acres of fresh meadow, at present known, because sometimes out of water, and also draining the balance under water, rarely seen. and never measured, —what an addition to the agricultural wealth of Essex County! These meadows now yield 10,000 tons a year. But drainage would probably double the acres, and treble the price. What may be the result of the long controversy respecting flowage on the Concord and other rivers can hardly yet be foreseen, but eventually *the meadows, it is believed, will be drained, and nobody hurt by it.*

Effect of Geological Formations on Vegetable Products.

It is a well-known fact that wheat was once a profitable crop in Massachusetts, and, it is believed, in this county; and it is equally well known that while a few districts seem still favorable to its growth, yet it cannot be generally raised on our soils. The operation of the law offering a bounty on wheat, resulted, for the most part, in *luxuriant crops of straw!* Dr. Jackson has remarked that it was interesting to the geologist and chemist to observe, during the operation of that law, in what particular districts the wheat crop did not prove successful, and important hints were derived from those observations. It is a question of considerable practical importance, as he well remarks, to know, by carefully conducted experiments, whether our granite soils can be so improved as to render them capable of bearing good crops of this most important grain again, without unreasonable expense.

But there is one other question well deserving the attention of both the scholar and the farmer, first suggested to the mind of the writer by the new President and Ex-Secretary of the County Agricultural Society (Mr. A. H. Dodge), which is,

whether *a knowledge of the rock formations will enable us to determine what kinds of crops are best adapted to a given locality?* As, for example, if scientific analysis has shown that in order to the successful cultivation of a given grain, all the fixed elements found in the grain and the straw must previously exist in the minerals constituting the substantial basis of the soil,— then it would seem that little else was necessary than to analyze the mineral basis of the various soils, and the products which the *climate* would indicate as being adapted to a given district, and adapt the crop accordingly. Practically, one difficulty presents itself, which is formidable, namely, the effect of cultivation, arising from the peculiar style of farming heretofore practised, and the great variety of manures heretofore used, by means of which the soil itself may have been modified largely, must have been modified somewhat. Besides this, it is suggested by the chemists, that it often happens that certain soils contain too small a proportion of the most important elements, to furnish, for a length of time, the inorganic constituents of the specific crops which the farmer wishes to cultivate. In such a case it is obvious, that however well a given product might do in a given locality, for a time, yet, when exhausted of that particular mineral element upon which the plant largely depended, the crop would gradually diminish, whatever else was done to the soil short of restoring the indispensable ingredient.

The difficulty of determining the question raised by the learned President of the Society, would be greatly diminished in a district where the soil was wholly uncultivated, as in the virgin soils of the West. But even in the long cultivated fields of Essex, it may not be without its use to inquire what, and how much, the various farm products are now yielding in the different parts of the county, in *connection with the geological formations* of the same localities.

Dr. Hitchcock, State Geologist in 1837, laid down the parent rock of Amesbury upon his geological map as being mica slate. This mineral is described as follows: "One of the older primary rocks; it produces a soil of medium qual-

ity. Some varieties of it underlie tracts of superior excellence."

The agricultural products in that town in 1855* yielded cash values as follows, viz: —

Wheat	10 bushels to the acre.			Value,	$20 00	per acre.
Rye	10	"	"	"	11 00	"
Barley	18	"	"	"	14 00	"
Oats	25	"	"	"	10 86	"
Potatoes	75	"	"	"	37 70	"
Onions	200	"	"	"	100 00	"
Beets and other esculents					50 00	"
Carrots	350	"	"	"	87 50	"
Indian corn	25	"	"	"	25 00	"

Andover lies upon a foundation of gneiss, another of the primary rocks. Dr. Hitchcock's description of its agricultural uses, is substantially as follows, viz: "Gneiss, which differs from granite only in having a slaty structure, occupies more of the surface of the State than any other rock. The soil resulting from the decomposition of gneiss need not be mistaken by an experienced eye. Its predominant ingredient is a rather fine whitish sand. The appearance of the soil from gneiss indicates uncommon poverty and sterility. But facts do not correspond to this anticipation, for in no part of the State (Massachusetts) do we find finer-looking farms, or the appearance of more thrift and independence, than in the region where gneiss prevails."

The agricultural products of Andover, having a soil lying upon this mineral, yielded in the same year (1855) cash values, as follows, viz: —

Indian corn	35 bushels per acre			$35 00	per acre.
Wheat	23½	"	"	46 88	"
Rye	13	"	"	16 25	"
Barley	20	"	"	20 00	"
Oats	22	"	"	13 00	"
Potatoes	100	"	"	100 00	"
Turnips	400	"	"	100 00	"
Carrots	400	"	"	112 50	"
Beets and other esculents				160 00	"
Onions	400	"	"	200 00	"

* See Industry of Massachusetts for 1855, published by order of the Legislature.

Beverly.

The parent rock is sienite. It is intermediate in its characters between greenstone and granite, although most commonly it is only a variety of granite. The soil is generally of a superior quality, probably from the fact that most of it must have been derived from decomposed vegetable and animal matter. It is usually of a dark color and fine texture.

The principal agricultural products in 1855 yielded a cash value, as follows, viz: —

Indian corn	33	bushels	per acre		$33 00	per acre
Wheat	20	"	"		30 00	"
Rye	20	"	"		26 60	"
Barley	18	"	"		18 00	"
Oats	20	"	"		10 00	"
Potatoes	70	"	"		70 00	"
Onions	400	"	"		200 00	"
Turnips	400	"	"		80 00	"
Carrots	400	"	"		80 00	"

In contrast with Amesbury, first above named, may now be compared another town of the same geological formation, viz:

Bradford.

Bradford produces	35	bush.	of corn	per acre	as often as	Amesbury does	25	bush.
"	18	"	wheat	"	"	"	10	"
"	20	"	rye	"	"	"	10	"
"	25	"	barley	"	"	"	18	"
"	40	"	oats	"	"	"	25	"
"	100	"	potatoes	"	"	"	75	"
"	300	"	onions	"	"	"	200	"
"	300	"	carrots	"	"	"	350	"

There being no other town in the county having a geological formation wholly of gneiss, as laid down on the map, with which to compare that of Andover, except its adjoining neighbor, North Andover, — that town in this comparison, is omitted, and the next in order is Beverly, having a sienite foundation; — this is now put in contrast with Hamilton, also of sienite.

Beverly produces	33	bush. of	Indian corn	per acre,	while	Hamilton has	40	bush.
"	20	"	rye	"	"	"	15	"
"	18	"	barley	"	"	"	20	"
"	20	"	oats	"	"	"	20	"
"	70	"	potatoes	"	"	"	80	"
"	400	"	onions	"	"	"	300	"
"	400	"	carrots	"	"	"	600	"

Here, then, it is seen that the same geological basis procures different results. Much of the apparent difference may proceed from the difficulty of obtaining the *actual amount of products*, where all is left to the judgment of the producer, subject only to the judgment of the officers of the towns, nothing having been weighed or carefully measured, as a general thing, the difference in the modes of farming and use of manures also coming in, as before mentioned. Upon the question, therefore, started by Mr. Dodge, it is not easy to pronounce. Further information is needed. Some light has been thrown upon the subject by Mr. Tracy, of Lynn, of very great value.

Mr. J. M. Ives, of Salem, has communicated the following upon this interesting topic, which is too valuable to be omitted.

"You ask, 'How far the varieties of trees growing spontaneously are affected by the geological structure of the soil?' My friend, Mr. Tracy, of Lynn, in the introduction to his small work on the 'Studies of the Essex Flora,' says, 'The chemist avers that to cultivate any crop successfully in the field, a *studied adaptation of the soil to the particular plant in view must ever be made.* The converse of this rule would indicate that special characters existing naturally in a soil should give corresponding differences in the kind and style of vegetation which it produces. If I wished for an illustration of this idea, I could hardly find a better case than appears in two formations, viz: In passing through Lynn Woods, it is not difficult to detect, even with small experience, the exact line of junction of the granite and porphyry within a few rods, by the style of vegetation alone. A few examples will make this more definite. On the rocky pasture hills that overlook the city of Lynn, the barberry starts in unrestrained abundance, the privet adorns whole acres in early summer with its clusters of snowy white flowers, and the pitch pine and red cedar assert their right to the land with the vigor of feudal barons. When we pass northward over this natural mark, the privet disappears almost entirely, the barberry becomes the exception instead of the rule, the cedars are scarce, and the multitudes of pitch pines are only represented by a few stragglers. To replace them, however, the beech (of which only two specimens grow on the porphyry to my knowledge, and these I suppose to be artificially located,) starts up at once almost on

the very boundary, and stretches away from thence in vigorous condition towards the woods of Lynnfield. The chestnut ventures down into the north of Saugus with commendable strength, but cannot cross the enchanted line without the help of man, and in cultivation grows slowly and timidly, as if it were ill at ease. More remarkable than either, the black larch or hackmatack, which I venture to say is unknown as a native south of the granite section, is found within fifty rods of its margin."

Changes and Improvements in Farming.

It is hazardous to speak of *improvements*, lest the changes of to-day should be exploded to-morrow. A shrewd writer in the County Society's Transactions for 1855, remarks that "agriculture, like everything else under the sway of humanity, is subject to a change of fashions, or, rather, notions. When the Massachusetts Society for the Promotion of Agriculture was in the vigor of its youth, (as we are informed by that Nestor of Massachusetts farmers, the Hon. Josiah Quincy,) the great criterion of a good farmer was the making of good *cider*, and the process of making it was one of the most studied and elaborate of all subjects of the farmer's attention; and, in point of complexity, length, and minuteness of care and preparation, was but little inferior to the making of glass, porcelain, or Java china." "Where," says the writer, "are cider-presses now?" This was a short five years ago; and yet the question, then so pointed, is fast becoming *pointless*. A method has been discovered of procuring "excellent champagne" from common cider, so that only the wine-taster can tell the difference. Other matters have come dancing on to the stage, since Mr. Quincy wrote the above, probably, like China Tree Corn, Rohan Potatoes, Gama Grass, Morus Multicaulis, and Chinese Sorgho, and have danced off again, a good-natured public paying the bills. The readiness with which the Hen fever was taken shows that the end of changes, or even *humbugs*, is not "*by and by*," and perhaps it will not have been without its use, if it should break the force of the stereotyped slander, that farmers *are the last men to alter*, for no

grandfather ever allowed himself to be so frequently humbugged as we the grandchildren have been.

Had the statistics of 1860 been as full as those of 1845 and 1855, they would have possessed a value almost beyond expression, as showing the changes constantly being effected. As it is, a comparison can only be made between the years 1845 and 1855. During that decade, the operations of the dairy were greatly varied, and the making of butter and cheese was restricted in many cases to the amount required for family use. The rapid increase of population in Gloucester, Lawrence, Newburyport, and very many other manufacturing villages raised the demand for milk.* The quantity returned by the officers in 1845, was 261,744 quarts; in 1855, it was 1,811,936 quarts, being an excess of over fifteen hundred thousand quarts. The price also advanced from three cents seven mills per quart in 1845, to five cents two mills in 1855. The number of milch cows in 1855 was 11,799, but as the number was not returned in 1845, except as included with "*neat cattle*" generally, the increase cannot be known. From 1855 to 1860, there was an increase of 1,441 milch cows in the county, the number in '55 being 11,799, and in the present year 13,240. It can hardly be doubted that this change will be permanent.

Orchards.

The number of apple-trees cultivated for their fruit in 1855 was returned at 239,127, but back or forward of that year, we are unable by the statistics to go. Upon an average, this number would give 88 to each farm. But the trees upon some farms are counted by the thousand, while very many inclosures, not taking the name of *farm*, are filled with the choicest of fruit. Pear culture also receives a good share of attention. In 1855, the number then in cultivation was 27,023. The value of the apples for the same year was esti-

* J. W. Procter, Esq. gives it as his opinion, that more than one half of the milk in the county is diverted from its usual channel and sold at market.

mated to be $166,905; and of the pears, $12,227. Essex is believed to stand upon a proud pre-eminence, in her fruits and flowers, particularly. As long ago as 1838, Mr. Manning, of Salem, exhibited no less than thirty-two distinct kinds of pears, which had then fruited for the first time in the county, and six kinds of apples wholly new to the county. In two years more Mr. Manning's list of distinct varieties of apples and pears had grown to fifty-four. Meanwhile others had caught the idea, and were carrying it out in all directions. The enthusiastic Mr. Ives, of Salem, electrified the county, as well by his admirable annual Reports made to the Agricultural Society for a series of years, as by his ardent and instructive descriptions at the head of the Fruit Department of the Show, — the fruits themselves being always arranged by himself or under his supervision. In his Report of 1838, while he informs us that he himself had that very year fruited no less than ten varieties of pear, and among them the true Capiaumont of Van Mons, for the first time, and also, six kinds of apples, nearly all of southern origin, he also lectures his brother farmers in the following style: "Although efforts have been made by several individuals to introduce choice varieties of fruit, still there is a lamentable negligence in many towns, of this important culture. The sixteenth part of an acre of ground appropriated to a nursery, would afford stocks for all the most desirable kinds of fruit that flourish well in this region." Appeals of this kind from year to year have not been wasted, but, in numerous cases, have fallen like good seed into good soil, and have sprung up and borne fruit, *thirty, sixty, and an hundred-fold.*

As the beginning and progress of fruit culture affords an important comment on the importance of associated efforts for the public good, it may be well to remark, that no special notice seems to have been taken by the Agricultural Society of the county, of fruits and flowers, as a distinct department, until their annual Report in 1836. Dr. Andrew Nichols in that year reported "per order," as follows: "That there was but little exhibited, and that little, in more productive

seasons, would not have been deemed extraordinary." Four persons, only, received gratuities. These were for "pound sugar pears, mammoth pippins, peaches, and apples, pears, &c." In 1837, the Committee, Messrs. Fox, Perry, and Duncan, say, "a greater variety of fruit was presented than on any former exhibition." They proceed to name "most if not all the specimens." Mr. Manning and Mr. Ives exhibit each *three varieties* of pear; Mr. Ives, three kinds of apple; Mr. Andrew Dodge, "two kinds of apple;" Mr. Wallis, "garden apples," and Mr. Lander, "fine apples." Mr Lander also exhibited "fine specimens of pears," and Mr. French "a basket of superior Bartlett Pears." This is all reported in 1837. It was in the year following, that Mr. Ives made his first Report above mentioned, when Mr. Manning produced his thirty-two kinds of pears, &c. The Society now received an impulse which it has never lost or allowed to flag; so that in 1857, the Committee report "Nine hundred and twenty-one baskets and plates from 204 contributors;" and in 1859, the Committee declared it to be "equal, if not superior to that of any previous year." The evidence of great advance in fruit culture, however, derived from the tables at the show, is not of the highest kind. The numerous acres of orcharding of all kinds of fruit, returned by town selectmen, is of itself presumptive proof of a great advance upon the time when the *Roxbury Russet* was the only grafted fruit in Massachusetts, and but very little of that.

This subject is so well treated by Mr. C. P. Preston, of Danvers, in a letter of Nov. 5, 1860, that no apology is necessary for its insertion.

"I cannot forbear, after the very kind invitation you have given me, to say a few words in favor of the very material advances since my recollection, in one branch intimately connected with the farm, viz: the *cultivation* of fruits, and particularly the apple. This branch, it seems to me, has been pursued of late with much more system and success than formerly. And, indeed, I know of nothing connected with the farm in which greater advances have been made in the right direction, than in the cultivation of the apple. To make this plain, I will state a fact within my own knowledge. In my neighborhood, I think within forty years, but two farmers raised grafted fruit, which they picked by hand, possibly 200 barrels. Others had more or less of natural fruit, with possibly two or three grafted trees. *Now*, within

the range of a square mile of this, in a bearing season, there are picked some 2,500 to 3,000 barrels of apples, worth say $1.50 per barrel. At the date first spoken of, the Russet Pearmain was almost the sole variety raised. Now, as you are aware, there are some ten varieties of standard apples. The trees, even from the seed, are raised, by good orchardists, with extreme care, and pushed into a vigorous growth by means of the best cultivation and manures, the choicest spots on the farm being selected for the orchard, and with reason, for it has passed into a proverb amongst the people, that the orchard yields the greatest income, with the least labor, of any portion of the farm."

The remainder of this interesting letter is omitted with regret, for want of room.

Nurseries.

As a most valuable addition to what has been said above of the subject of fruits, the two letters that here follow give a somewhat connected history of nursery operations in Essex. The reputation of the writers will secure for them an attentive reading. The first extract is from a communication of Mr. John M. Ives, of Salem.

"The first sale of trees offered here was by George Heussler, the gardener of E. Hasket Derby, Sen., of Danvers. In 1790, he advertised that he had, at this garden, 'a very extensive nursery of useful plants and trees.' Mr. Derby's son, soon after this, began to raise trees, which he offered for sale on his grounds in South Fields, Salem. In 1822, Robert Manning commenced, on his grounds in North Salem. He was one of the best pomologists of the day, particularly in his knowledge of the varieties of pears. He was succeeded by his son. Their premises contained, at least, 2,000 varieties of fruit. Of these were 1,200 pears, 400 apples, 200 plums, 100 peach. In 1831, Mr. John C. Lee, at his grounds in North Salem, sold ornamental trees. In 1836, John M. Ives commenced the cultivation of fruit trees, and in connection with this was agent for the sale of trees and plants, from the Linnean garden of Wm. Prince & Son, of Flushing, L. I. In 1841, Chas. F. Putnam commenced a nursery of fruit trees and plants in North Salem, and in connection with his brother Francis, cultivated the strawberry, rose, and peony. Their stock of roses and peonies was very extensive. This nursery is still continued. Ephraim Wood, of North Salem, has a nursery of the apple, pear, and cherry, which still continues. Joseph Needham, of South Danvers, near the line of the Georgetown Railroad, has thirty-eight acres of land devoted to the cultivation of the apple, strawberry, and the smaller fruits. Nathan Page, Jr., of Danvers, at the Plains (near the famous and ancient Endicott Pear tree), has a young and thrifty nursery of pears, and extensive beds of strawberries, where all the reliable kinds of native and foreign varieties may be seen. Sam'l C. Pitman has also a nursery of forest, ornamental, and fruit trees in Swampscot.

"In addition to the above, I would say that there are many forcing-houses as well as green-houses in Salem, where plants are propagated and sold annually. The grounds of Mr. Rodgers, who has been for many years experimenting on the culture of the grape, and also the extensive fruit-houses of I. F. Allen, are well worth one's visit. These two gentlemen are endeavoring to obtain, by hybridizing, a hardy out-door grape, which will ripen in our country. Mr. Rodgers has from forty to fifty distinct varieties. His Nos. 19, 15, and 22 were examined at our last show, and were pronounced good. (See our last Report.)"

Dr. Dean Robinson has kindly furnished the following information: —

"The first who commenced nurseries in West Newbury were Joshua and Moody Ordway in 1828. They entered into the business quite largely and with good success. Their nurseries, I believe, have been reported in the Transactions of the Essex Agricultural Society. Joshua sold his interest in West Newbury and left the town and the business. Moody has continued steadily and successfully at his Garrison Nurseries. Soon after the Messrs. Ordway commenced, Mr. George Thurlow went into the business quite largely, selecting his best nursery trees to set upon his own farm, and selling largely. He has an orchard of more than five thousand ingrafted trees, nearly all Baldwins. Three fourths are now in bearing condition. He set between his apple-trees some hundred peach-trees, which proved of no use. All are removed. He also went largely into cherries, which I judge has proved an unsuccessful enterprise. The trees, like others in the vicinity, are fast going out. Mr. Thurlow has a large farm, requiring all his time, and has quit the nursery business. He has a flock of fine Leceister ewes, which are fed in the orchard, which is now in bearing state. In the other orchard he lets his swine run. His only son, Thomas C. Ordway, has entered into the nursery business on a large scale. He seems fully competent, having been in the business in Illinois, and given much attention to it. He has now a lot of apple-trees two years on the bud, of a fine appearance, and others coming on. He has also a large lot of cherry-trees, grape-vines, currants, &c. There are no other nurseries in West Newbury, and I believe none of any account in Newburyport, Newbury, Georgetown, Groveland, Amesbury, or Salisbury."

Miscellaneous Improvements.

Manures—Root Crops—Indian Corn—Farming Implements—Underdraining—Pasturage.

In looking at the progress of farming in Essex County, different minds, taking their views from different stand-points, arrive at different results. The following are a few of these results to which the writers have come, the same being furnished for this sketch by request.

Mr. J. W. Procter, of South Danvers, says: —

"I should say that the greatest improvement I have witnessed in the general style of farming in our county, during the forty years I have been connected with our Society, was in the preservation and application of manures; by care in collecting and composting materials for this purpose. When this is faithfully done, crops are readily doubled, even without going off the farm for fertilizers. And when it is considered that, by due attention, ten inches of pulverized soil can be secured in the place of *six* ordinarily used, it is easy to account for the improved crops among our best cultivators.

"The introduction of *root crops* for the feed of stock is a decided improvement. When I first viewed farms in company with our first President, Col. Pickering, it was rare to find a field of carrots; *now* it is more rare to find a good farm on which there are none grown. Forty years ago, fifty bushels of *Indian corn* to the acre was considered a good crop; now, no man should be satisfied with less than seventy or eighty bushels to the acre. Such, sir, are the first impressions suggested by your letter. If they are of any value, you can use them as you may think proper."

Mr. A. W. Dodge, in speaking of the changes and improvements in farming within the last quarter of a century in this county, says: —

1. "The introduction and very general use of machinery for farm purposes, as the horse hoe or cultivator, horse rakes, horse mowers and threshers, by which a vast saving of time and money has been effected; the great improvement, too, in all the usual farm tools has tended to the same result.

2. "Our farmers formerly raised nearly all the articles of consumption on the farm and in their families; *now*, they buy more to bring home and sell more from the farm. The making of milk and raising vegetables for the market, in their neighborhoods have become a very general characteristic of our farming. As a consequence, less butter and cheese are now made in the county.

3. "The greatest improvement *to be* made in our farms is the renovation of our pastures for pasturage. They are fast deteriorating, and the prospect for the future in the way of sustaining neat stock in summer is very alarming. Hardly anything has been done in this direction, and the progress of the failure is so gradual that it seems to attract little attention. If sheep culture is equivalent to pasture culture, give us sheep by all means."

Mr. Wm. R. Putnam says: —

"In answer to your inquiry respecting the improvements which have been made in farming within the last twenty-five years, I would mention, first, the greater attention paid to preserving manure from exposure to the weather; and by constructing barn cellars, more of the liquid manure is saved; also, the greater amount of peat or muck used as an absorbent, and in the compost heap."*

"The most marked feature in the way of agricultural improvement is," in the opinion of another correspondent, "the introduction of the special culture of certain

* Most of the other improvements mentioned by Mr. P. have already been described.

crops requiring great care and attention and more than ordinary skill in order to insure success. Such is the case with the onion crop and other roots, and herbs, which are very largely cultivated in Danvers and in Marblehead. The lands are liberally manured and kept perfectly clean, and while yielding great crops, they are evidently improving in fertility. A man who has but one or two articles which he raises for market, and who confines his attention entirely to them, is more likely to cultivate understandingly, than in the usual system of general husbandry. He soon learns whether he is making money or losing it; whether the cultivation is profitable or otherwise. The labor and manure expended on a single acre of cabbages is, on an average, not less than one hundred dollars, and a good crop, the inevitable result of the expenditure if accompanied with reasonable skill, pays a very handsome profit. Four to five thousand cabbages are not unfrequently grown upon an acre, for which there is always a ready market, at from six to ten dollars per hundred.*

"The onion crop, until rendered uncertain by the maggot, has been a most profitable crop in the towns before named. Indeed, it is almost impossible to credit the statements which are given upon this point, although coming from the most reliable sources. Here again we see the expenditure is very large in manure, eight or ten cords to the acre, which is worth five to six dollars per cord; the labor in weeding alone is at the rate of thirty to forty dollars per acre, although labor-saving implements are freely used, and yet a profit of from one to three hundred dollars per acre is the result. In the case now before my eye, † the writer makes out a much larger profit per acre than the largest sum I have named, and I have seen much larger profits shown than his."

Lime and Ashes as a Manure.

The scarcity of stable and barnyard manures, in connection with the great amount of labor necessary for making, preparing, and using them, naturally leads to the inquiry for substitutes. The two articles above named, if not the most common, are among those easily obtained, and require more examination.

That Salts of Lime, or lime in some of its forms, are indispensable to successful vegetation, is too well settled to be doubted. What per cent of the carbonate, or sulphate, or phosphate, is to be found in the lime of commerce, does not appear. Indeed the lime of commerce itself, is not all of the

* See Transactions Essex Agricultural Society, 1860, pp. 92, 93.

† Franklin Alley's. See Transactions Essex Agricultural Society, 1859, p. 75.

same quality in all respects. The magnesian lime is unfriendly to light and sandy soils. In well-authenticated cases, it has been found to set into a perfectly hard mass, owing to its hydraulic peculiarities, so that it has been taken out of the ground in a solid plate. Where soil is charged with decomposed vegetable matter in an acid state, alkaline correctives are the remedy. These may be obtained in the form of leached ashes, containing a large percentage of lime, as well as silicate of potash. The ashes absorb water easily, and, unlike the sandy soil, retain it well and give it out to vegetation gradually. The alkaline qualities neutralize the acid substances of the soil, and change inert vegetable matters into active ones, and insoluble matters into soluble ones, easily taken up by the rootlets of the plants, though useless until thus changed.

There can be no doubt that many thousand acres of land in Essex County would be improved by the application of wood ashes alone. Even leeched ashes are of great value upon sandy soils. It is indeed upon soils of this kind exclusively, or chiefly, that alkalies are useful. Large tracts in Lawrence, Methuen, Hamilton, and elsewhere, demanding relief, answer fully to the description of lands in North Providence, R. I., to wit, "sand and sandy loam." Yet upon the farm of William Rotch, in that State, although the analysis shows but 4.5 pounds of both soluble and insoluble vegetable matter, to wit, crenic and apocrenic acid, or, to adopt the appellation of Dr. Dana, "*geine*, the food of plants," (and the analysis of the above-named towns in Essex shows a much larger proportion, in the parts analyzed by Dr. Hitchcock, of the same elements,) yet the agricultural products in Essex fall far short of those in Rhode Island which are treated with *alkalies*. Thus the "soil and sandy loam" of the Rotch farm above named in 1839, where this sandy and gravelly soil had been amended principally by "spent wood ashes," and manured with seven cords of manure to the acre, the yield was sixty-four and one-half bushels of Indian corn to the acre; while it appears by the Massachusetts Statistics of Industry, that Lawrence pro-

duces out forty bushels to the acre; Hamilton forty, and Methuen thirty-three bushels; and it does not appear that the sandy parts of the latter towns are embraced in the returns. "Spent wood ashes," says a letter communicated by Dr. Jackson, the eminent geologist and chemist, "have been the principal manure used in amending the condition of light loams, and sandy, gravelly soils. On all these they are used to great advantage. Before leaving this topic, it may be remarked that it is only the bald and sandy parts of Ipswich, upon High Street in the northerly part of the town, that are included in the description of "sandy soils:" also, that it is only the gravelly and sandy portions of the other towns enumerated, that are included. Upon these portions as they are, the corn would fall far short of the amount specified.

Some of the phenomena relating to the salts of lime, in agriculture, present difficulties to the practical and scientific farmer, to which it may not be unimportant to recur. *Whence does the soil derive the salts of lime which it is annually supplying to the vegetable world?* No one principle is better settled in agricultural science, than that some convertible salt of lime is essential to the fertility of soils. Nay, the theory of Davy and multitudes of others is, that certain crops *cannot be raised upon a soil destitute of lime.* If it is deficient in quantity, though present in fact, the crops dependent upon it are meagre or entirely worthless. The soil of Essex generally contains no carbonate of lime at all which could be detected by the analysis of Dr. Hitchcock. Three and one half per cent. of the sulphate of lime has been found, on analysis, in West Newbury, two per cent. in Bradford, one and a half in Methuen. In Marblehead 2.7 per cent. of sulphate; that is, gypsum is found in Andover 1.6 per cent., in Gloucester 1.5, in Danvers 2.7, and a still smaller percentage of the phosphate of lime in the same towns. Notwithstanding this slight amount of these salts of lime in the soil, the ashes of wheat invariably contain both the phosphate, which is found in the soil, and the carbonate, which is not; the former being an essential element of grain itself; and the ashes of Indian corn

yielding no less then 36 per cent. of the phosphate of lime! The question recurs with increasing interest, — From what magazine does the soil supply these indispensable elements? And, as if to create still greater confusion in our ideas, it is suggested by an eminent geologist and chemist, Dr. Hitchcock, that this calcareous matter is *increasing* in quantity upon the surface by some strange transfer "from the inferior to the superior strata," so that, even without artificial supplies, enough will continue to be furnished, except for those grains which, like wheat, require more than they find.*

It may not be necessary for our present purpose to investigate this subject further. The amount necessary for most crops, however minute, seems to be always present, and in the aggregate that quantity we should not call small, were it necessary to supply it artificially. An accurate calculator has shown, that the apparently insignificant proportion of one per cent. amounts, in a soil whose specific gravity is 1.6 to one pound in a cubic foot of soil, and 43,560 pounds to the acre, or 21.78 tons; or if we allow the depth of tillage to be only six inches, there will be no less than 10 tons and 890 pounds.

Some of the richest of soils have been found, by a most accurate analysis, to contain less than three per cent. of calcareous matter in the states of carbonate, phosphate, sulphate, crenate, and apocrenate of lime. A rich, alluvial soil from the banks of the Mississippi, taken from a sugar plantation 100 miles above New Orleans, was found by Dr. Jackson to contain only 2.8 of the carbonate, phosphate, and crenate of lime, while the insoluble silicates, the mere granitic sand, amounted to 81.4 per cent; and only 2.02 per cent. of phosphate and crenate of lime could be found by Prof. Silliman, Jr., in a

* Johnston, in his Agricultural Chemistry, page 196, in attempting to account for the existence of lime in the soil, remarks that "if we consider that when animals die, their bones are chiefly buried in the earth, and that over the entire globe, animal life in one or other of its forms, prevails, we should not be surprised that, in almost every soil, the earth of bones should be found to exist in greater or less abundance. Nor can we have any difficulty in conceiving, if such be the case, whence plants draw their constant and necessary supplies of this substance." This is reasonable, and, did it not conflict with Dr. Hitchcock's analysis, would seem satisfactory.

specimen of rich alluvium brought from the river Nile in Egypt by one of our missionaries. This should encourage the farmers of old Essex, for it appears that in the land of Egypt there is only *one per cent. more*, even of the *phosphate* of lime, than was found here by Dr. Hitchcock, when making his survey, and *that* in a case when the same analysis detected two per cent. of the *sulphate* in addition. It may be regarded as the triumph of chemistry to have discovered the first grand desideratum in the soils of our country, even if it is yet unable to inform us how to supply it; and a triumph of equal value to have discovered that the *second desideratum is geine, the food of plants*, and which is itself the *crenic acid* of Berzelius, discovered by him in 1832, — a substance found probably everywhere, but in smaller quantities than the farmer could wish.

Sea Sand as a Manure.

No inconsiderable source of agricultural wealth, it is believed, will erelong be found to be lying along many portions of our sea coast. Immense quantities of beach sand are every year taken from Gloucester, Ipswich, Plum Island, and probably Beverly and Lynn, for mortar used in the laying of brick and stone. But it is as a *manure* and absorbent of ammonia that it becomes important to the farmer, or rather as increasing the value of the common and better known manures chiefly or wholly by its *mechanical operation.* The great objection to its use is the *weight* of it. But it is one of nature's appliances, and deserves more attention. Its mechanical operation is obvious. A great desideratum, if not *the great* one, is to *pulverize the manures and the soil itself* to such an extent that the rootlets may find the nourishment they require *at the time when it is required.* Who has not noticed a field of Indian corn *laboring* through the early part of the season, and, indeed, in a dry year quite too long for a good crop, merely because the manure had not been *forked over* enough (to use the common expression), a laborious job always. The ad-

vantage of the sand will be better understood by a little reflection upon the manner in which the plant appropriates to itself the food it requires. This *act of appropriating* is indeed an operation *not to be seen, but only believed.* It is expressed *variously* by the chemists. Dr. Dana says, "the salts and earths *form voltaic batteries with the roots of growing plants,* by which the *'granitic sand' is decomposed, and the nascent earths, in this state readily soluble, are taken up by the absorbents of the roots, always a living, never a mechanical operation.*" That is to say, of course, the *delivery* of the nutriment on the part of the soil, and the *reception* of it on the part of the plant is the *living* operation, that operation which is not open to the observation of bystanders, any more than *growth* can be witnessed in animal physiology. Dr. Nichols, in speaking of this interesting topic, says, "a plant is like an infant, as respects the preparation of its food. It has no teeth to masticate, no salivary glands to pour out diluting fluids, to render digestible its rocky aliment, and yet it can receive it only in a liquid, soluble form. Its mouths are microscopic, and nothing, not minutely subdivided, can pass their portals."

These considerations will aid in understanding the use of sea sand in connection with manures and soils, but especially the former. The common method is to draw manures from the barnyards in autumn, pack them in the field, and in the spring to lay the new-made winter manure, from the barn windows or barn cellar, by the side of the former, — to work both kinds over and bring them into one heap or *string.* After this working over and mixing of new and old, the mass is left to ferment, if it will, and is then put out on the hills with a shovel. It is even now but too often in a state most unsuitable for being taken up by the fibres of the plant. The land may be rich in carbonates and geine, but neither the soil nor manure is in a condition to be used by the plant. Had river or sea sand been used liberally in the manufacture of manure, it is obvious that in point of fineness it would have been most unlike the coarse dung from the yard. Then, also, the freest use may be made of the sand for cattle bedding, from the time

of their coming to the barn in autumn till they leave it for the pasture in spring. For this purpose, it should be drawn from the beach in summer or autumn, in season for drying, and thrown daily upon the cattle beds, so as to mix at once with the manure.

Farmers adopt different methods for using sand. It is sometimes laid over the entire barnyard, after being cleared, to remain a year, when it comes out with the mass which has accumulated above it, and goes with it to the field. The mixing by the time it is needed for use is sufficiently perfect, and the rootlets pass through the sanded manure with the greatest facility. It is also frequently used as a covering for the manure thrown from the barn windows through the winter, as is the case where there is no cellar. In these and in other ways it may be and is used with great advantage. The only drawback among farmers living remote from the sand banks is the *heavy* nature of it. But as an offset to this, it *never wastes or dries up.* It is evident that the same will readily admit the carbonic acid into the soil, so that it can fix its corrosive teeth in the minute grains as the fibres come in contact with them, thus effecting the same operation which Dr. Dana calls the discharge of the "voltaic battery." "Soluble geine is the food of plants," says Dr. D. "and insoluble geine becomes so by air and moisture." The air and moisture are admitted by the sand with great facility, and hence the advantage of it in agriculture.

As an absorbent of urine and retainer of it, sand appears to perform an office almost contradictory to its very nature. The grains being wholly of quartz or silica, cannot receive a liquid; but such is the amazing *fineness* generally, the urine is retained in the *mass* until drawn forth by the living root fibres.

A most successful farmer in the town of Essex, living near the sand banks, informs the writer that he annually gets some 90 to 100 tons to be used in his manures. On clearing the cattle yard in autumn, he first covers the floor of the yard evenly with this sand. Other matters are then brought into

the yard, and upon these layers the cattle are yarded for the year. The sand, however, retains its identity. The whole is usually mixed by repeated shovellings over, by the time it is put in the hill for planting. But sometimes the experiment is made of trying the sand by itself; and it is found that with no mixture of other manure, except the urine which has leached through into it, it will procure as much corn as cattle dung, *bulk for bulk.* Another farmer, residing in Ipswich, has had similar results. He declares he can raise a crop of corn with sand *if it has only been through the grip.*

Changes effected by the Action of the Sea.

Although these changes are not supposed to affect the *agricultural* world, yet in the sea-girt County of Essex it would be unpardonable to overlook this well-known cause of geological phenomena.

The mouth of the Merrimac River exhibits decided traces of the ocean's power. History informs us that a fort, for the protection of Newburyport in the revolutionary war, stood upon the northern end of Plum Island, and consequently upon the western side of the Merrimac, at its mouth. The remains of that fort are now upon the *opposite side of the river.* Probably the sea encroached upon the land, both above and below the fort, until at length it broke across and formed a new channel, leaving the fort as it now is, upon the Salisbury side. Dr. Morse, in the early edition of his Gazetteer of the Western Continent, published in 1797, says, " there are two lighthouses at Newburyport, of wood, removable at pleasure, according to the shifting of the bar, thus showing that these changes are of no recent date.

Rockport presents a scene of peculiar grandeur. Thatcher's Island is from one half a mile to a mile southeast of Flat Point in this town. From a point opposite the western end of this island, and running eastwardly beyond Straitsmouth Island Light, a distance of one to two miles, the whole coast

is rock-bound. The formation is gneiss, and it is stratified to a high degree, the strata varying in thickness from a few inches to two feet, and lying horizontally. The shore is sloping, and 10 to 15 or 20 rods wide, rising to the level of the upland. The sea and shore are here in everlasting conflict, and, iron-bound as it is, the shore has the worst of it. It is to be regretted that Dr. Hitchcock did not visit this interesting spot, although Dr. Benjamin Haskell's description of it is very animated and truthful. It was inserted in Hitchcock's Geology of Massachusetts, p. 133.

Dr. Morse, in his Gazetteer, before referred to, says, "Thatcher's Island, on which are two lights of equal height, lies close to the southeast side of the township (now Rockport), which itself is joined to the continent by a beach of sand, which is very rarely overflowed by the water." The island is now, as before stated, at a long distance from the main land, and separated from it by the deepest water, the sand beach having long since disappeared.*

But the changes effected under the observation of living men bear ample testimony to statements of the historian and the theories of geologists. The scientific observer to whom Dr. Hitchcock was indebted for the description referred to, states orally further, that it was in the memorable storm of 1831 that the windrow of boulders, a half mile in length, was formed upon Flat Point. Those boulders were broken from the aged parent rock in blocks of from a few hundred pounds' weight each to 10, 15, and 20 or more tons. The remainder of Dr. Haskell's description I give in his own graphic words: "There is one far more interesting than all the rest, both on account of its greater bulk and comparative regularity of shape, which renders it easy to be estimated, and thus afford the means of ascertaining the maximum force of the ocean in its anger.

* Thatcher's Island was at first called "Thatcher's Woe and Avery's Fall," from the fact that, on the 14th of August, 1635, in a violent storm, as Rev. John Avery was sailing from Newburyport to Marblehead, where he proposed to settle in the ministry, the vessel was wrecked, and Mr. Avery was drowned, his wife and six children, with fifteen others, while Mr. Thatcher and his wife were cast upon the shore and saved.

Barber's Coll. Allen's Dict.

This rock was originally attached to a ledge about five feet above the level of the sea. The broken surfaces correspond so exactly as to leave no room to doubt from whence it was detached. From this spot to the place where it now lies the direction is south, a little westerly. The distance is 106 feet; but between the two positions there is a hollowing of the ledge (that is, in the broad surface upon which the rock in question rested), the hollowing *not a recent one*, over which it must have passed, so that the ascent of the rock up this old-fashioned railway cannot have been less than ten feet."

The "hollowing" above mentioned is a dike some ten feet wide, and once filled with greenstone trap. The trap is full of seams, and, hard as greenstone is said to be, the mighty untiring waves dig it out, slowly indeed, but surely. By allowing a block of gneiss containing 12 cubic feet to weigh a ton (the present mode of estimating), the boulder in question would weigh 30 tons instead of 28, as originally estimated by Dr. Haskell, and this is his present estimate.

In accounting for the fact that boulders are found poised by some mighty power upon other rocks, and those far up the highest hills, we are compelled to call in to our aid the power of *another agent;* and the *glacial theory of Agassiz*, and *the iceberg theory of Sir Charles Lyell*, are made to testify and to argue in the geological court; but the breaking up of the strata into blocks at Flat Point, the windrowing them in 1831, and spreading the windrows like straws of hay in the storm of 1851, was all done by those twin sisters, the winds and waves alone. To one who has seen this effect of the sports of the elements in a case so clear as this at Rockport, it is not altogether so incredible that the boulders upon Cape Cod should all point, as they do, to Cape Ann for their parent rock.

An interesting change effected by the action of the sea, at no very remote period, is shown at Marblehead, on the southwesterly side of the thickly settled part of the town, and opposite to the farm of Ephraim Brown, upon the Neck. This interesting "inlet, telling its tale of erosion," is pointed out by J. J. H. Gregory, Esq. of that town, whose knowledge of geology

is well known to the reading public, and who, it is hoped, in this day of instruction by lectures, will consent to instruct the public through that medium.

The account will be best described in Mr. Gregory's own words, communicated by letter of a recent date. After describing the appearances of this action in former ages, he proceeds: "Nor has this degrading action of the ocean yet reached its limit; not a storm of great violence occurs without leaving its destructive mark along our shore line. Two prominent illustrations of the probable change of the coast line by ocean agency may be seen in the great curve that sweeps in from 'Bartoll's' to 'Skinner's Heads,' also in the great curve that begins at Bass Rock, in the northeast extremity of the town (Marblehead), and tends away to the southwest, towards the entrance of Salem Harbor."*

Salt Marsh Alluvium in Connection with Changes effected by the Sea.

The existence of extensive tracts of salt marsh occurring in most of the inlets along the fifty miles of sea coast of Essex county has attracted the attention of geologists to some extent, and may properly claim a notice in connection with the subject of changes effected by the sea. It is the grateful duty of the geologist to read out unwritten history, or, in the elegant language of Edward Everett, "to rouse the generations of the elder world from their pompous mausoleums or humble graves to rehearse their fortunes."

That all the territory which we call salt marsh alluvium has been, by the operation of natural causes, reclaimed from the sea, there can be no doubt. They are salt marshes, even now monthly overflowed by sea water, effected by the causes that produce tides. Creeks emptying into the sea, and twice a day being filled from the sea, flow through all this alluvium at

* "See also 'Proceedings of the Essex Institute,' vol. 2, the proof-sheets containing Mr. Gregory's interesting article on the geology of Marblehead, about being published.

intervals, receiving fresh water from ponds and springs sufficient to keep them open.

The origin of this alluvium has been the subject of some speculation. Dr. Hitchcock believes it to be "the result of the joint action of two, and sometimes of three causes. 1. From the decay of salt-marsh plants. 2. From the silt brought over the marsh by the tides; and 3. From the alluvial soil brought down by streams. The depth of the peculiar pulpy soil of these marshes," he remarks, "is rarely more than six or eight feet." This depth corresponds with the usual depth of the creeks, and favors the idea that where the marsh now is the broad river once spread out and ran; so that the earth now bears its plants where the sea once rolled its waves.

Notwithstanding the perfect uniformity of the surface of the salt marshes and the similarity of the vegetation, yet they are often of very unequal value in different localities. The usual method adopted to improve them when barren is by ditching, so as to drain off both the surface water, if any, and the more deleterious waters that often gurgle at the bottom. Frequently, however, all measures fail, and they seem condemned to hopeless barrenness. An analysis by competent chemists, however, might point out a remedy. At worst, however, if unprofitable in any other way, they may prove of great value as manure, and indeed it seems wisely ordered that the unproductive portions should be, as they are, near the upland, as if for easy removal to the barnyards and fields. Experiments made by the farmers, as well as the analyses of the chemists, both show a difference in the mud, even for the purpose of manure. It is often spoken of as too acid to be of much practical value upon the field. Dr. Hitchcock says, "it sometimes contains a large quantity of geine, and sometimes but very little, while the quantity of the salts of lime, soda, and magnesia is rather large," and adds that "sometimes a mixture of marl would be of service, and sometimes not." Marl, however, that is calcareous, is not found in the neighborhood of salt marsh, so far as known; the substance underlying peat in Essex County, so strongly resembling it,

being found always, so far as known, to be silicious wholly, and supplying no lime. The following is Dr. Dana's method of analyzing marsh mud, with the result: —

Locality.	Soluble geine.	Insoluble geine.	Sulphate of lime.	Phosphate of lime.	Granitic sand.	Specific gravity.
Cambridge..	13.0	7.4	2.3	0.4	76.9	1.92
Newburyport	1.5	0.1	3.0	0.5	95.1	2.52
Medford ...	7.5	5.6	2.6	0.3	84.0	1.92

As the topic is so important to the farmers of Essex owning salt marsh, and as it has usually received so little comparative attention, and the remarks of Dr. Hitchcock are so important, while they are accessible to so few, it seems proper to quote what he has said upon the subject: "A substance so rich in geine, or salts of lime and soda, or in both, ... cannot but form a fertilizer of the soil, if spread upon it. If the soil be quite poor, those varieties should probably be chosen that contain most geine; and this can be judged of by their comparative lightness when dry; the lightest abounding most in organic matter. But if the soil already contain a good deal of inactive vegetable matter, the varieties that abound most in salts will probably be most efficacious; though an additional quantity of geine can do no harm, and may do much good. If marsh mud be applied at random, it is not strange that varieties of it almost destitute of geine should sometimes be put upon exhausted soil, and that no good effects should follow. Hence the necessity of some fixed principles to guide the farmer. And since Massachusetts contains so much seaboard and so much land near the coast that may be benefited by this substance, a correct mode of applying it is of great importance."

It will prove unfortunate for the cause of agriculture, beyond all doubt, that writers have sometimes thrown ridicule upon the method of analyzing soils recommended by both Dr. Dana and Dr. Hitchcock, and that some gentlemen attending our legislative agricultural meetings should utter the same sentiments, going, as they are sure to do, into the agricultu-

ral newspapers, and producing a world-wide influence. A truly scientific method of analyzing, conducted in such a manner as to detect every element, would require months, it is said. But is it not evident that very many minute matters would be revealed which are just what the producer of crops does not wish or need to know? He does, however, need to know whether his soil would be improved by an application containing the carbonate of lime, for example, and to know it he ought to know whether there is or is not enough of it in the soil already. The method is this: "Put a small quantity of the soil into a watch crystal or any glass open vessel, placing it in the strong light of the window; the soil is to be covered with water and stirred till the light matter has risen to the top; the impurities are to be removed by drawing a piece of bibulous paper over it, so as to leave the water clear; a few drops of muriatic acid are now to be added and the water to be carefully watched to see if the bubbles rise; this they will do if there be any carbonate of lime in the soil."

The acid is a cheap article, and can be purchased at almost any apothecary's shop. The same test would enable the farmer to ascertain whether the sandy matter underlying peat, and which so much resembles calcareous marl, is such; the absence of the bubbles on applying the acid would show it to be anything but calcareous marl; and the bubbles would show the presence of lime in some of its forms. A very simple method of ascertaining whether muck contains so much acid as to be injurious to vegetation, is to stir a small quantity of it in a vessel, with sufficient water to hold it in solution, and while in this state to put a piece of litmus paper into it. Acid will color the paper.

Effect of Location in Relation to the Sea.

A topic of much interest respecting the effect of sea air upon vegetation has been recently started by the learned geologist of Marblehead, Mr. J. J. H. Gregory, in an article prepared

by him for the Essex Institute on the geology of that town. I am permitted to make the following extract from the proof-sheets kindly furnished me by the author: —

"Formed for the most part from the decomposition of her primitive rocks, the soil of Marblehead, though scanty, is proverbially strong, covering our pasture lands, that have been closely fed over a century and a quarter without any cultivation or manuring, with a carpet of white clover during the rainy season. The soil of our islands is so amazingly productive of the grasses as to set all the attempts of the chemist to explain the fact from the chemical composition of the soil at defiance; no one can realize it until he has visited them during the growing season, (Baker's Island is an instance,) and I challenge any one to explain it by any theory that does not ascribe an influence far greater than has heretofore been customary to the qualities communicated to the air from the surrounding ocean."

Upon reading this glowing description of Mr. G., also referred to on another page, I conceived the idea of testing this theory by a comparison of a few of the products between the towns lying immediately upon the sea-coast in Essex County with those remote from the sea, yet within the county limits. The result is as follows, viz: —

English Hay in Towns contiguous to the Sea.

In Beverly, the average amount by statistics of 1855 is				1.00	ton per acre.
" Gloucester,	"	"	"	1.41	"
" Lynn,	"	"	"	1.27	"
" Manchester,	"	"	"	0.97	"
" Marblehead,	"	"	"	1.16	"
" Rockport,	"	"	"	0.91	"
" Salisbury,	"	"	"	1.00	"
" Swampscot,	"	"	"	1.27	"
" Salem, including Baker's Island,			"	1.50	"
Average of English Hay in the above nine towns,				1.16 5-9	"

Towns remote from the Sea.

In Andover, the average		by statistics of 1855 is		1.05	tons per acre.
" Boxford,	"	"	"	0.73	"
" Georgetown,	"	"	"	0.94	"
" Groveland,	"	"	"	0.80	"
" Hamilton,	"	"	"	0.73	"
" Haverhill not given.					
" Lawrence,		"	"	0.70	"
" Methuen,	"	"	"	1.10	"
" Topsfield,	"	"	"	0.76	"
" Wenham,	"	"	"	0.71	"
Average amount of English Hay in the above nine towns,				0.83 5-9	"

Thus by the said statistical returns the average hay crop in the sea-coast towns exceeds that of the inland towns by $\frac{33}{100}$, or one third nearly.

Same Test applied to the Indian Corn Crop.

In Beverly, the average amount of Indian corn			by stat. of 1855 is	33	bush. per acre.
" Gloucester,	"	"	"	42	"
" Lynn,	"	"	"	43	"
" Manchester,	"	"	"	$47\frac{1}{2}$	"
" Marblehead,	"	"	"	46	"
" Rockport,	"	"	"	40	"
" Salisbury,	"	"	"	$40\frac{1}{3}$	"
" Swampscot not returned.					
" Salem, including Baker's Island,		"	"	40	"
Average in the above eight towns,				41 23-48	"

Towns remote from the Sea.

In Andover	Indian corn	35	bushels	per acre.
" Boxford	"	21	"	"
" Georgetown	"	28	"	"
" Groveland	"	$31\frac{1}{2}$	"	"
" Hamilton	"	40	"	"
" Lawrence	"	40	"	"
" Methuen	"	33	"	"
" Topsfield	"	$29\frac{1}{2}$	"	"
" Wenham	"	30	"	"
Average in the above nine towns		32	bushels	per acre.

The excess upon the coast being $9\frac{23}{48}$ bushels per acre.

It will not be pretended that the excess of the hay and corn crops in the ocean towns over those in the interior certainly proves the fact advocated by the writer (Mr. Gregory) referred to above, viz: that the atmosphere of the sea naturally augments the product of the farm. Other causes may be in operation. The abundant supplies of manure furnished by the sea are nearly or quite confined to the shore towns, while the facilities for muck are as great it may be in these same localities as in the interior, thus giving a double advantage to the one class of towns over the other, without calling in the sea

at all. Had the products been accurately weighed and measured from every part of the county, and accurate and authentic records made for 200 years, some comparison might be made, always subject, however, to modification by causes palpable, seen, felt, and read of all men. But such a comparison is out of the question, and our investigations must stop. It is not in the ordination of Heaven, however, ordinarily, to give a section of country signal advantages over a sister section without leaving something compensatory. The atmosphere which seems to bring golden harvests to Swampscot, Marblehead, and Gloucester, may carry consumption and fever upon the wings of it, of which Andover, Lawrence, and Methuen know little. Or a hundred bushels of corn per acre on the sea-board may have required as many extra nights' work upon the beach in poling and drawing up eel-grass and kelp as shall make a crop of 75 bushels per acre in Haverhill fully equal to it.

Sheep Husbandry.

There is no topic relating to the agriculture of Essex from which we feel so repelled as this. Here is a district containing over 200 sets of woollen machinery, within three hours' ride of every man in the county, working more wool into stock in a single day, by 6,000 pounds, than is produced in the whole county in a year! Even in 1845, when the mills were making 2,650,000 yards of flannel and blanketing, and 700,000 yards of other woollen cloth, with 100,000 pounds of yarn not made into cloth of any kind, there were but 4,467 sheep, producing but some 16,000 pounds of the raw material! And this small flock was still further reduced, in 1855, to 2,217, having gone down 55 per cent. in 10 years; and, as if they were still too numerous, a farther reduction of 23 per cent. is found to have taken place in 1860, leaving 1,717 that were over six months old, and no more, by the most careful count! We feel almost as if — like Shem and Japheth — we would take a garment, and go backwards, and

cover the nakedness that is so shameful, only we reflect that we ourselves are the party that is so sadly uncovered.

How large a number of sheep have ever been kept in Essex, we are not able, by any statistical table, to discover. A memory of fifty years only, brings to view very fine flocks of 40 to 50 upon almost every hundred-acre farm. Yet for aught can now be known, dogs were as numerous, as hungry and bold, then as now, and fences worse by a large per cent. And if the memory of man is worth anything, the pastures were better in that former day than now. The statistics are scarce, and to be found only in fragments, but Dr. Morse, in 1797, speaks of "large herds of sheep and neat cattle." It cannot be doubted that, by keeping sheep, the value of the now run-down pastures was then standing at a higher figure. In the absence of the appropriate matter for this topic in the present essay, it may not be without its use to adduce a few of the many proofs of the fact that sheep-culture is useful to pasture lands.

A Committee of the English House of Lords, in 1828, received and reported the following statements: Mr. John Ellman, Jr., of Sussex, testifies as follows, viz: "I do not consider it possible for the light lands upon the Downs to be kept in cultivation without flocks. I could not keep the farm I now hold without sheep. On the South Downs the wool must be grown, let the price be what it will."

Mr. Francis Hale, of Altringham, Suffolk: "The description of land I occupy could not be kept in cultivation without sheep."

Mr. Henry King, Chilmark, Wiltshire: "The size of my farm is 4,000 acres. I clip usually about 6,500 South Down sheep. Such lands as I occupy cannot be kept in cultivation without the aid of sheep.

Lord Napier: "If we had not sheep upon our lands (the Highlands of Scotland), they would become the habitation of foxes and snipes, and return to waste."

C. C. Weston, Esq.: "It is utterly impossible that the

Down districts can be cultivated without sheep. We never fold our merino or other sheep; the land is too wet."

To the above is now added the following testimony of Mr. R. S. Fay, already quoted above on another topic: —

"The number of sheep," he says, "is now increasing, and any one walking from Salem to Lynn during the last summer, could have seen over five hundred sheep, in good, improving condition, upon pastures which have been long utterly useless for any other purpose. A visit to those same pastures in the following spring, from their superior herbage and greenness, will show the action of sheep as renovators and improvers."

The decreasing value of our pasture lands is attributed by Mr. Fay, without any hesitation, to the neglect of the farmers of Essex in not keeping sheep.

Mr. Corliss, of Haverhill, is said to be a very successful breeder of sheep. His buck, "Dr. Kane," weighs 200 pounds; his fleece, on 12th May last, weighing eleven pounds. He is from Cotswold, bred from the imported buck "Cedris" and an imported ewe. Eight of the ewe lambs got by this buck ("Dr. Kane") were also exhibited at the show, of an average weight of 80 pounds each.*

The Leicester sheep of Wm. F. Porter, then (1853) of Bradford, were very superior, taking the first premium against the South Downs of Jacob Farnum, of Andover, in the same year.

Other gentlemen have kept, and are keeping, a few of the imported breeds of sheep, and with profit. The experience and observation of Mr. Fay leads him to give "a decided preference to the Oxford Down sheep, being, in his opinion, best suited to the Essex pasture lands, and affording the largest yield of good mutton and wool for its cost."

* He took the County Society's premium, 1860, in competition with an imported Oxford Down, shearling buck, weighing 247 lbs.; weight of fleece 14 lbs., — the animal having received a premium as a buck lamb, in England, previous to his importation.

R. S. F.

Neat Stock.

Essex has long been celebrated for the excellence of its neat stock, while, at the same time, the animals were almost wholly miscellaneous, selected from the droves from Maine and New Hampshire while on their way to the great markets of Brighton and Cambridge. The effect of these facilities was that no systematic efforts were made to obtain distinct breeds. Very superior animals were occasionally obtained. The Oaks cow has never been beaten; but every effort to perpetuate her superior milking qualities in her progeny was a failure. A brief sketch of the celebrated cows in Essex, of no particular breed, is here made, as being itself an argument against miscellaneous stock breeding; for, however justly celebrated the individual cows may have been for their yield of milk and butter, they generally, if not uniformly, prove to be merely a kind of "tenth transmitter of a rotten race." The Danvers cow — above called the Oaks cow — made 180 pounds of butter in 1813, 300 pounds in 1814, 400 in 1815, — 1 quart per day being reserved for family use, and a calf suckled for four weeks in each of the years. In one week, 19¼ pounds of butter were made, and the average for three months was 16 pounds. The Nourse cow, owned in Salem, produced 20 pounds in one week, and the average for four months was 14 pounds. The Barr cow gave 7,517 pounds of milk in 268 days. The sales, including the calf, amounted to $151.15. The Putnam cow in fourteen weeks gave 3,370 pounds of milk, making 139 pounds of butter. The Osborn cow in seventy-seven days gave 3,127 pounds of milk. The cow of Charles F. Putnam, of Salem, yielded in one year 4,214 quarts, which, at five and six cents per quart, gave him $244.03, the estimated expense of her keeping and milking being $91.53; clear profit, $152.50. (*See* Society's Report for 1841.)*

The above remarkable cows may be said to have been, as before stated, accidental. The opportunities which were so

* For further information, see the Transactions of the Massachusetts Society for the year 1856.

long open to Essex farmers for selecting stock while on its way to the large markets, have failed since the facilities for transporting cattle by railroad began. Doubtless, superior breeds of cows might, by careful breeding, have been obtained by a fortunate choice of a bull put to the cows above named. That time having gone by, and the frequent opportunity for obtaiuing country cows having ceased, no method of improving stock seemed left to us but that of importing stock known to be of superior quality. Public-spirited gentlemen of affluence have turned their attention in this direction with gratifying results. Mr. Fay, of Lynn, Mr. Rogers, of Salem, Mr. Franklin Haven and C. G. Loring, at Beverly, Gen. Sutton, of Salem, and Dr. Loring, of Salem, with several others,* are able to show the pure English breeds of cows, and some, if not all, of sheep. The unfortunate introduction of the pleuro-pneumonia with Mr. Chenery's herd, may check, but will not prevent, the further introduction of foreign breeds. In addition to the importations destined to go on, farmers will purchase the pure breeds, as their interests and inclinations may lead them.

It is not intended by this train of remark to discourage an improvement of native breeds, but only to give a clear idea of the requisite labor, skill, and length of time necessary for creating distinct breeds, without which no reliance can be placed upon anything.

Raising of Horses.

The raising of horses as a distinct branch of husbandry, if not quite overlooked in the early years of the County Agricultural Society, did not certainly receive very strongly

* Dr. J. Kittredge, of Andover, a gentleman much distinguished for his zeal and discretion in raising stock, says, in a note of February 25, that, though he has never owned a pure Durham, yet he firmly believes it superior to all others, both for cows and oxen. The gentlemen above named have generally preferred Jerseys and Ayrshires.

marked attention. The Society was formed in or about the year 1817. The great mind of Col. Pickering early impressed itself upon the Society. No mention, however, appears to have been made by him of the *horse* in his addresses, delivered in either 1818 or 1820, notwithstanding the subject of "live stock" is treated ably, and the principles of Bakewell, the English breeder, are examined and recommended. It does not appear that premiums on horses were offered by the Society earlier than 1831. No horses, consequently, were exhibited at the show, upon which any attention was bestowed, until the next year, 1832. Mr. Andrews Breed then reported for the Committee that "the exhibition of these animals has been highly satisfactory and pleasing. Premiums of $20, $15, and $10 were awarded, and gratuities of $5, $3, and $2. From that time, it is believed, the horse has had fair share of attention.

It may be questioned, indeed, whether the principles of Bakewell and Arthur Young, and Sir John Sinclair and Mr. Knight, have been always consulted and well understood. The Morgan and Blackhawk breed of stallions, and perhaps a few others, were very fine animals, and were brought into the county at an early day, but no attention, or very little, it is believed, was bestowed upon the mares. Distinct and well-defined breeds were therefore, at first, certainly, quite out of the question. Farmers needed and sought the farm horse, without much regard to speed. This latter quality, indeed, has never been sought by the trustees or the society at large, although roadsters have become, quite recently, somewhat in demand.

The idea of a horse for all work will eventually be abandoned, and we shall fall into the English system of a distinct breed for the road; while, with regard to the mass of horses, the main points will come to be bone, muscle, and strength. "Weight, size, and bone," says R. S. Fay, in an unpublished letter to the writer, "are more easily obtained than speed." "A breeder," he further remarks, "will fail nineteen times out of twenty in producing an animal of such superior merit

for speed as to command a fancy price, but, with ordinary skill, he will succeed nineteen times in twenty in raising an animal that will bring a fair price, if he aims to produce a horse for the team.

Horses bred from approved stock for this purpose, such as the Cleaveland Bay, the Clydesdale and the Suffolk Punch, will bring, if up to the standard as to size and weight, $300 to $350 in the Boston market for the truck, and the price is likely to go higher from the increasing scarcity of this class of animals. If they fall short of the necessary size and weight, they are quite as likely to make good farm horses as any of those now bred. A Yorkshire gentleman once told the writer that he, his father and grandfather before him, had bred several horses every year during the three generations, and had always bred one each year for the turf, using the best mares they could get, and the highest cost stallion in the county, and that they had never succeeded in breeding one that would sell for seventy guineas at three years old, while a neighbor who had never bred an animal for the turf, until within a few years, netted for his very first colt, before he was four years old, seven thousand pounds. At the same time, he said that his Cleaveland and Clydesdale stocks always paid a handsome profit. Upon the remark being made that his neighbor probably in that one profit had received more than all that he had gotten for his years of labor, — "Perhaps so," was the reply, "but my neighbor's first success will probably prove his ruin. He is now going very extensively into thoroughbreds for the turf, and if his account were made up, even in the short period that has elapsed since his first success, it would probably be found that he was out of pocket." "Depend upon it," he concluded, "it is the cart horse that pays."

Lambert Maynard, of Bradford, and Josiah Crosby, of Andover, are said to have raised more horses than any two men in the county, though other gentlemen have produced many. Essex has relied upon Vermont quite long enough for her horses. It is gratifying to learn that the public mind is

moving in another direction, viz: that of raising her own. The danger of overdoing is quite as great an evil, however, as underdoing, and a caution to aim at the golden mean, rather than the disastrous one, should be the rule of action.

The following letter from Dr. George B. Loring, written by request, is inserted as affording a salutary caution on the subject of breeding horses, as well as for its excellent matter generally.

"The questions propounded by you, with regard to the breeding of horses in our county, are somewhat difficult to answer. I have very strong doubts whether it can be made a very profitable branch of the business of our farmers. It used to be said that all a man paid for a horse over $100 he paid for fancy. I suppose that may be said now, simply substituting $150 for $100. Now, this fancy part of the business constitutes pretty much all our profit; and this can be reached only by those who have taste in breeding and selecting, and skill in breaking and driving the horse, to say nothing of the leisure time necessary. Our farmers, then, cannot afford to raise a mere beast of burthen called a horse. The animal matures slowly, and requires, for four or five years, a great deal of good food. He is liable to many accidents which may render him useless. And after reaching maturity he may be worth but little. He is not very likely to pay for the hay, and grass, and grain which he has eaten. Let us see how this is. Say nothing of the loss of service of the mare while in foal, and estimate: Use of stallion, $5 (the lowest price I know of); keeping the first year, hay $15, pasturage $5; second year, hay $20, pasturage $5; third year, hay $30, pasturage $10; fourth year, hay $35, pasturage $15; making $140 as the lowest cost of the horse at four years old. At this age, few horses are worth that amount of money, and, in the ordinary mode of breeding, it is more than probable that the owner of such a colt would be able to suit himself better with a horse from Canada, or Maine, or Vermont for $100. It is evident that a farmer in Essex County can purchase a farmer's horse cheaper than he can raise one; that he will be very likely to suit himself better by purchasing, and that he cannot expect to convert the products of his farm into horse flesh to so much profit as he may expect to derive from them if converted into butter, cheese, milk, beef, pork, &c.

"It seems evident to me that the only horse that can be profitably bred by our farmers is a carefully selected roadster, — the American horse of all work, — that horse which will do his duty patiently on the farm, and command a high price for his speed and endurance when brought to market. It may be said that such a race of horses does not exist; that every individual of this description is an accident, and that no man can expect to arrive at this point of excellence in horse-breeding as surely as he may in the breeding of cattle, sheep, or swine. This is to a certain extent true. And yet, I think a selection of male and female may be made which will furnish the kind of horse I have described with a great degree of certainty. There is in New England an abundance of good-sized, roomy, strong mares, having courage and endurance, which can be obtained, usually, at a reasonable price. We have medium-sized, hardy, easy-gaited stallions, also, of very approved quality,

and bred from good trotters. When the service of such a stallion can be obtained at a reasonable price, I have no doubt that the chances would be in favor of profitable breeding from the kind of mare I have described. It will not always be so. A good mare and good stallion may be the parents of a poor colt, owing to uncontrollable and unknown causes. But this is all the chance a farmer in Essex County has, and nothing but an experiment will teach him how well his mare will breed. I know mares in the county that have been a source of large profit to their owners. So have some of our stallions, and that deservedly.

"I think you will agree with me that horse-breeding with us is a lottery, even when conducted with great care, skill, and judgment. None but a good horse will pay for raising here. In fact, none but a good animal of any description will pay for raising; but the large necessary outlay in the horse increases the risk over any other domestic animal."

Market Days.

That market days will erelong become a fixed fact in Essex County, cannot admit of a doubt. In England, public markets are one of the "institutions." I run back over the pages of English history in vain for an account of the origin of market days; the cloud of antiquity hangs over their origin. The London Encyclopedia has the following definition: "The Market, Clerk of the Court of—an officer incident to every fair and market in England, to punish misdemeanors therein. . . . The object of this jurisdiction (see stat. 17 Car. II. cap. 19; 22 Car. II. cap. 8; 23 Car. II. cap. 12) is principally the cognizance of weights and measures, to try whether they be according to the true standard thereof or no," &c. The reference here to the ancient statutes of England, carries us back to an early period. The antiquity of the English market days may also be inferred from facts of another description. Thus, Barclay's old Dictionary, embodying also a sketch of the counties, cities, and market towns (the new edition of which was published seventy years ago), mentions the following among numerous others; it will be perceived that the days were as permanently fixed as the market itself. "Barnstaple, a seaport town of Devonshire, with a market on Fridays. It sends two members to Parliament; is seated,

&c. The market is large for cattle, corn, and provisions, 191 miles west of London."

"Harlow, a town in Essex, whose market is on Saturdays. Distant 23 miles from London."

Market Jew, a town in Cornwall, with a market on Thursdays. It is 283 miles from London.

"Marshfield, a town of Gloucestershire, with a market on Tuesdays. 100½ miles west of London."

"Hampshire, an English county, 40 miles in length, and 35 in breadth. . . . It contains 253 parishes, and 20 market towns."

The shrewd English farmer well understands the importance of bringing the consumer and the producer together. American farmers have not yet fully comprehended the idea, even if it has been considered at all, that selling to the drovers and carriers constitutes a heavy draft upon the producer.

The first attempt to introduce agricultural markets in this county was made in 1854. The Annual Address of that year, thus introduces the subject to the attention of farmers.

"The establishment of regular markets or fair days through the county, at the most accessible points, would be of very great advantage to a farming community like ours, the members of which have at all times something they wish to sell or buy, but who have at no one time enough to make it an object to go to the larger markets. To do this, if done at all, this Society should take the initiative. If fixed market days were established, we should soon see the convenience and economy of it, both to purchasers and sellers. Cattle, sheep, pigs, and poultry, as well as corn, oats, rye, and other vegetable products, would thus be collected together in sufficient quantities to bring purchasers for the larger markets, and a farmer would then be able to sell whatever he had to dispose of at full market prices, as well as to make his purchases there. . . . The danger would be, if they were successful, that every town in the county would insist upon having a market day, and, as we have seen in other enterprises, all the benefit of them be lost in consequence. If, however, the members of this Society were earnest in the matter, and would agree to uphold those established by it, to the exclusion of all others, it would soon settle into a system not likely to be disturbed."

With the subject thus brought fairly before the minds of the members, it received occasional attention, but no decided action until 1859.

It is not necessary to delineate the progress of the Trustees in coming to the result. It is perhaps sufficient to say that the first market was held at South Danvers; the second at North Andover, May 20; the third at Georgetown, June 21, and the fourth at Newburyport; all in 1859.

The vigilant Committee having charge, prepared 40 of the Society's cattle-pens. No less than 70 individual farmers and others sent in their cattle to the number of 190 head; also 112 pigs and 96 sheep and lambs. Farm implements were also on the ground. Mr. Putnam, Chairman of the Committee, reported that "the results of the first market were all that could be expected." This was the South Danvers show, being the first.

At the second market (North Andover), the unfavorable state of the weather, together with the fact of an "independent sale" of stock, one day previous, in the neighboring town of Methuen, operated disadvantageously, as might have been expected. Still, however, the fact that 130 head of cattle, 102 swine, 22 horses, 15 sheep, and 11 coops of fowls, together with wagons and other vehicles, also numerous farming implements, were present, goes to show what may be expected when this infant of a span long shall become like a "giant refreshed with wine."

The Chairman of the Committee of the Georgetown market, Solomon Nelson, Esq., reported that, "owing to the foul weather, the market was not so successful, generally, as it would have been had circumstances been more favorable." "Confidence," he remarks, "is a plant of slow growth, and it will take time to establish these days upon a permanent basis."

I take the following lively description of an English market day from the recent travels of a New Englander in old England. It is true the description relates to perhaps the largest market in the world, but the same system is pursued over the entire island.

"Everybody has heard of Smithfield; in the minds of some, it is associated with the fagot and stake, with heroic martyrdom for liberty and truth, and as the great

confessional of Protestant England. Others, in a more mundane spirit, rejoice over Smithfield as the great centre from which noble barons of beef and the juiciest of steaks radiate into every kitchen of London. Beginning near St. Paul's Cathedral, two great thoroughfares, diverging but slightly, penetrate London to the westward. . . . This is Smithfield, and here the animals that are to find rest in the stomach of alderman or vagabond, lord or lout, are driven for the inspection of the butcher and for purchase. Early in the morning, a stranger living in the vicinity of any of the great thoroughfares which terminate here, will be awakened by the bellowing of oxen, the lowing of cows, and the bleating of sheep. He seems to be in the midst of some vast farmyard, instead of the heart of the most populous city in the world. It is well worth the traveller's while to leave his bed at early dawn, and watch the progress of the droves through the narrow street. The sheep, in particular, often amused me. A single shepherd, assisted by a small dog, sufficed to guide a flock of two or three hundred of this most wayward of all animals through the crowded streets. The dog, assisted by an encouraging word from his master, would spring on the back of one of the flock, and race from back to back, never touching the ground till he reached the offending animal, when a single pull by the ear restores the vagrant sheep to his proper place. I once saw two large flocks meet at the corner of two streets, and going at right angles to each other. It was wonderful to see the tact and intelligence of the two little colley dogs. Twenty men could not have done what these little creatures did in restoring order. The flocks had got into an inextricable confusion, but a pull by the wool or the ear, done with great rapidity, the dogs jumping into the middle of the flock, and selecting all stragglers which had got into the wrong road, in two minutes had the sheep all separated, and jogging again towards Smithfield. One of these shepherds told me that you might mix up a thousand sheep, and in a few minutes his dog would have the five hundred belonging to his master all safe by themselves.

"One part of Smithfield is devoted to the sale of donkeys, two days in the week, and an amusing sight it is. Such a pack of very sharp-looking vagabonds, with their eye teeth cut ever since they were babies, if, indeed, such hard-looking customers ever had a babyhood, I never saw. Cutting and hauling at the bridle of some meek little dwarf, and making their big cudgels resound on their hollow sides, they will trot their animals up and down the short walk devoted to this purpose, and tell more lies about him than they utter sentences. His price is eighteen shillings, and he is only selling him because he is going into the draying business, and will need a larger animal; or he is disposing of him because the child for whose use he is kept has recently died; or the friend who owned him has gone to America. No lie that will serve his turn ever comes amiss. I never fully realized the fact that homeless boys in large cities never have a childhood, till I saw these donkey merchants. It was perfectly frightful to see lads from twelve to twenty years old with all the cunning, avarice, and brutality of a rogue in grain pictured out in their countenances. . . . An immense number of donkeys are used in England. Cheap in price, and very hardy, they cost but little in shelter and food. Half a dozen donkeys will thrive in a pasture where a horse would starve."

The apparent failure of the market-day enterprise in Essex

is to be attributed mainly to the panic created by the pleuro-pneumonia, that mysterious but dreadful agent which visited our country too recently to require any description here.

As a substitute for the market day at different points in the country, the Agricultural Society of the county, at the suggestion and by the approval of their Committee on markets, proceeded to establish a market, to be held on the last Tuesday of every month, commencing on the 24th of April, near Berry's Tavern, in South Danvers. The local advantages were all that the Committee or the public could desire. The Committee, by their Chairman, Mr. Fay, expressed in their bills the hope that in course of time a large market would grow up at this point, and that those whose business it is to supply large markets, as well as those who buy for direct consumption, would find it for their interest to attend this market. Every accommodation for stock of all kinds can be found at Berry's. "No further notice," says Mr. Fay in his handbills, "is to be given of this market, but it will be left to work its own way into importance, trusting to the utility of the measure alone to effect this object."

The pleuro-pneumonia has passed away, it is believed. Confidence will be restored, although its growth has been a little slower than is common; and it is believed that the market days at Berry's will soon be one of the institutions which nothing but an apparent providential frown will prevent or at all interrupt.

Farms and Farmers.

It may not be improper to specify a few of the farms of Essex, premising what every reader will at once perceive, viz: the difficulty of making a *selection*. The statements that follow have already been before the public since 1856, but as the facts were collected by the writer, and furnished by him

for the County Society's Transactions, there can be no impropriety, it is conceived, on the ground of *authorship*, in inserting them as a part of this essay.

Farm of Horace Ware, of Marblehead.

Mr. Ware deals with manures in no stinted way, and his crops are accordingly without stint. He has applied not less, he thinks, than 200 cords the present year, (1856.) One hundred dollars worth of stable manure he purchased, and drew it, say five miles. Forty cords of muscle-bed mud were drawn off upon the ice, and about 400 loads of kelp and rock-weed from his beach make up his amount of sea manure. About 100 ox-cart loads of meadow mud, and 30 to 50 loads from the vaults, both to be had for taking away, make up the mass applied to his farm. The night soil and meadow mud are mixed in the proportion of one of the former to three of the latter.

Kelp, stable manure, and barn-yard manure, make the compost for the onion crop, being applied at the rate of five to six cords per acre. Stable manure costs five dollars per cord. Wherever Mr. W. has used guano upon his grass land, as a top dressing, he thinks every 200 pounds has given him an extra ton of hay. Early in June last, a piece of grass put on a rusty appearance and seemed dying. About the middle of June, he sowed 200 pounds of guano to the acre upon it. The weather was rainy, and in about one week he thinks the grass was doubled, being changed in color from yellow to a lively green. And yet the guano seems to have done its great work upon the cabbage crop. A large table-spoonful was put in each hill, mixed with a peck of soil. This was upon reclaimed meadow, once submerged, but now producing 4,000 noble cabbage-heads to an acre. He thinks there would have been *no cabbage on that land without the guano.* Of super-phosphate of lime, Mr. W. has used but little, but intends to buy guano more largely than ever.

For squashes, he generally ploughs in a dressing of green barn manure, and harrows, if on the sod. The hills are eight feet apart each way. Five seeds are planted in each hill, and three are left to grow. The ground is stirred five or six times with a horse hoe or cultivator, and hand-hoed three times. Two or three shovelfuls of night-soil and meadow mud, well mixed, are put in each hill. The holes are made a foot and a half in diameter, and of the same depth. "The worm at the root," says Mr. W. "affects none but a crop too sparingly manured." One other fact in favor of high manuring was learned at Mr. W.'s, viz: When he took the farm, in 1833, it was overrun with white weed; but good culture and heavy manuring exterminated the whole: the grass became so vigorous as to bind it out and keep it out. Mr. W. has always raised fine crops of winter rye; 25 to 35 bushels per acre is a common crop; and the straw is worth about as much as English hay. It grows to the height of six or seven feet, and is *mowed close* instead of being reaped or cradled. Mr. W. has a mile of underground drain. He estimates his crops to be worth $5,000, and says it has cost about $3,000 to carry on his farm. But, interesting as it might be to dwell on a case of successful farming, regard to brevity forbids it further.

Indian Hill Farm, West Newbury, written by Dr. Loring,

who visited the farm with the author, and prepared the statement by request. Extracts from Dr. L.'s letter: —

I think you will agree with me that Indian Hill Farm is one of the most beautifully located spots in Essex County; and that, in addition to its charming landscapes, it possesses a variety of soil and agricultural resources rarely met with in the same extent of territory. It has an additional interest, too, in the fact that Major Poore, the present proprietor, occupies the acres of his fathers, possessed by them from the earliest settlement of the country, and made rich by time in the traditions of his family. Few estates in this country have more objects of interest. The house, built as we were told, according to the architecture of the ancestral mansion in England, carries you back to the days of the lordly halls of barons, when tower and turret had an important and serious signification. The curiosities which have been collected by Major Poore tell of a busy and stormy world, whose murmur alone can reach that quiet spot. The elm-tree in front of the door, planted by Rufus King in the early days of his patriotic service, brings before you a crowd of interesting scenes, from times whose every event was replete with the deepest interest. The whole place, with its relics of the Province House, its antique printing press, its armor from Malta, its sword of the revolution, its horse-shoes from Arabia, its bits from Mexico, its collection of autographs gathered from the most valuable sources, its rich agricultural library, forms an object of attraction to the scholar, the man of taste, and the farmer.

Mr. Poore, in showing the farm, you will remember, disclaimed all credit for himself, as the improvements were projected and generally carried on by his father, Benjamin Poore, Esq., one of the early members of our Society. Although engaged in mercantile pursuits, which allowed him to pass but a few months of each year at Indian Hill, Mr. Poore was enthusiastically devoted to the care of his homestead. A record of his labors is contained in a detailed journal, kept under his direction, of all the work done on the farm from 1818 to his departure for California in 1850. This journal is continued by the present proprietor. In its account of ditching, blasting rocks, deep ploughing and building, with the importation of cattle and seeds, we can trace the gradual improvement of what in 1818 was an ordinary tract of land, with a fence around a swampy portion of it to prevent the cattle from getting mired. At first, these improvements were looked upon with prejudice, and in 1828 a committee of the Essex County Agricultural Society simply alluded to it last among the six farms entered. The underdraining, and the rotation of crops, introduced by a Scotch manager, met with no favor. "While it remains uncertain," says the report, "whether the innovations that have been introduced upon *Yankee husbandry*, are not experiments made for display, unmindful of the cost, rather than experiments that will remunerate themselves, — your committee feel it to be their duty to hesitate in approving of the same."

Mr. Poore, as his farm journals show, was not discouraged, but continued the same system, and entered the farm again in 1844, when the Massachusetts Society for Promoting Agriculture offered premiums for the best cultivated farms. Eleven farms were at that time entered, and the first premium of two hundred dollars was awarded to Indian Hill Farm, with an additional gratuity of fifty dollars for experiments in draining. Long articles from Isaac Hill, John S. Skinner, Henry Col-

man, and Joseph Breck, in the agricultural journals of the day, indorse the high terms of praise awarded to Mr. Poore, by Mr. Phinney in his report, as the farm "long noted for its durable and well-contrived structures, and for the systematic culture of its grounds." The swamp of 1818 was then thoroughly drained, and produced a heavy burthen of English hay, — a remunerative experiment.

Indian Hill Farm contains 121 3-4 acres, with over 200 acres of outland pasture, woodland, and salt marsh. The entire homestead is under cultivation, with the exception of eight acres, on the steep sides of the hill, covered with thrifty young forest-trees. This plantation of trees, which received a gratuity of thirty dollars from the Essex Society in 1843, now contains upwards of four thousand trees, — black and red oak, walnut, scotch fir, and locust.

The buildings on the farm are very substantial and convenient. The barn is 120 feet in length by 42 in width, with two wings, each 80 feet in length, one of which is connected with the house. It has a basement story of stone containing the stables, root-cellar, hennery, cider-mill, and hay press. The horses and cattle stand on stone pavements, with stone gutters leading to a large manure tank, into which loam is frequently thrown during the summer. The hay is stored in the second story of the barn, on either side of a floor 200 feet in length, upon which ten or twelve loads of hay can stand at once to be unloaded. One wing of the barn contains a carriage house, cart shed, and carpenter's shop, where all the ordinary repairing of the farm is done. The barnyard is so arranged that the drainage is carried into the tank above mentioned. The stock on the farm generally consists of four oxen, seven cows, and four young cattle, mostly Durhams crossed with the Ayrshire, which cross has been found to be most profitable for the farm.

Farm of Francis Dodge, of Danvers.

This is a farm of 115 acres, and situated upon the summit and sides of a beautiful swell, overlooking Salem harbor and the Bay, with a large part of Essex County, and in sight of Wachusett, if not Monadnoc Mountains. The orcharding is splendid, — from 500 to 600 trees, and chiefly fruited well. This is a milk farm to a great extent, having twenty-three cows. The other stock consists of six oxen, three horses, and one bull. Mr. Dodge has owned and occupied this farm since 1840, although singularly enough it has changed owners five times within twenty years. It stands the present owner at $7,500, and apparently needs but few repairs. The stone walls are a sight worth many miles of travel to see. They stand six feet high in the clear. They are founded too upon rocks, having a ditch-wall, and are built of stone so massive, and with such finish, that a man may go with a loaded wheelbarrow upon the top, round entire fields. So we are told by one of the previous owners, and we can very well believe it.

Mr. Dodge has half an acre in squashes, which attracted much attention on account of the crop which was, like many others this year, *more than large.* We speak of it to say that it was manured with one part night soil to three of meadow mud. On inquiring for Mr. D.'s method of treating the yellow squash-bug, he informed us *he does not kill or suffer the bug to be killed;* not, however, out of any special regard to the insect, but because in killing, you almost always injure

the vine itself, — that is, the tender and vital part, by pinching; that same tender part, however, will bear the application of quicklime, which is more than the yellow-bug can bear. There could not have been less than seven tons of squashes, it was thought by some present, upon the half acre.

Farm of Ephraim Brown, situated upon Marblehead Neck, so called, in Marblehead.

It need not be said that the productiveness of this farm has been a frequent topic of remark for some years. To those whose manures have been found somewhere in that long list enumerated by Mr. Richardson in 1854, where "forest leaves, chips, shavings, earth from the poultry yard, pigeon house and ash bins, scraps of leather, and coal ashes," were but small specimens, — the crops of Mr. Brown have indeed been incredible. While Mr. B. has not neglected his barn-cellar and barn-yard, for they both show that they have had the most careful attention, yet so happily is his farm located, and so wide awake is Mr. B. to the value of sea-manure, that all the wealth of his land may be referred to that one word of Mr. Richardson, precious "kelp."

It is no disparagement to farmers remote from the sea-shore, that they resort to the humbler and scantier means of making manures; it is their glory to do so; they must do so or die, and half the world would die with them. Not one in a hundred of our farmers is situated by the sea-side. And as an apology for those who doubt the statements of the great productiveness of Mr. B.'s farm, not one in a thousand has ever stood on the leeward side of a heap of kelp in three or four days after it has been brought together. No farmer acquainted with the subject of manures can witness the rapid decay and consequent odor of this article, without conviction that the *published* results of Marblehead farms are *possible*. This, then, will be presumed to be conceded. And when the due amount of *skill* in applying the manures, and adapting the crops to both soils and manures is brought into requisition, then, in the words of Thomson, "laborious man has done his part," and the soil will not be ungrateful.

Mr. Brown has some 35 acres of land under the hoe and plough. His help is Irish altogether. He has ten to twelve men through the summer, though now (19th October) only nine. Mr. B. keeps a blacksmith to do the work of the farm, — an arrangement almost indispensable, as his place is a mile and a half from the town. Mr. B. boards his men, and pays from ninety to one hundred and thirty dollars per year for labor; no one but the blacksmith receiving more. Before his present arrangement of the blacksmith's shop upon the farm, the blacksmith's bill amounted to about $150 per year. Sixteen cows are generally kept upon the farm, though at this time but twelve. No butter is made on the farm, or cheese, milk being more profitable than either.

As Mr. Brown makes neither butter nor cheese, he also raises no Indian corn. This arrangement affords a great amount of time to devote to other crops, and among these onions take the lead. It may as well be said once for all, that as before stated, no man this year offers his farm for premium, and as Mr. B. in particular offers nothing whatever for premium, so perfect accuracy is not expected, either in regard to the measure of land or the weight and measure of the crops. State-

ments will therefore be made with such accuracy only as the visitor's own judgment aided by the owner's knowledge will afford.

Mr. Brown had eight acres of land in onions; the largest lot containing about three and a half acres. This lot is in the underdrained field exhibited in the Transactions of the Society for 1854. A portion of this lot, (viz. that part which before under-draining was covered with stagnant water much of the year,) say from one fourth to one half an acre, has now upon it the greatest yield of onions, beyond all controversy, ever raised in the county of Essex. Mr. B.'s estimate, I believe, was 1,000 bushels to the acre for this spot. I cannot estimate it at less than that, and indeed find I had marked on my memorandum as high as 1,200 to the acre for the spot referred to; and in my present estimate of 1,000 bushels, I am fully sustained by several gentlemen, Trustees of the Society, who visited and examined this field just before the onions were pulled. They were then lying upon the ground, and perhaps seen to better advantage. This amazing yield, it is true, is confined to a comparatively small spot; but if the whole eight acres shall be found to have less than 5,000 bushels of marketable onions, I shall be disappointed. The average would be 625 bushels, and as that amount has not unfrequently been reached in the county, I cannot believe it too high. The manure was chiefly the decomposed kelp before mentioned, ploughed in, with a small quantity of compost manure. Mr. B's usual quantity of the kelp is 8 to 10 cords to the acre, but in 1854 he put on 12 cords to the acre, and undoubtedly that extra amount is felt in this year's crop, although some fields have suffered by the drought.

A lesson is to be learned from the fact, that upon one side of the under-drained field, for perhaps thirty rods, the last year's crop was *turnips*, — and there the onion top is yet somewhat green; but where the onion follows a *carrot crop*, it is nearly as ripe as when following onions themselves. The onion rows in this and all the other lots are fourteen inches apart.

Other fields in onions presented crops every way equal to the one above described, with the exception of the quarter or half acre particularly described. One of these fields, now partly in grass, was taken out of the pasture in 1836.

Guano, it may be said in passing, has proved useless upon Mr. B's annual crops of all kinds, though 200 pounds per acre, he thinks, has given an extra ton of hay.

Fruit Farm of Dr. Mack, Salem.

Trenches were first dug for the trees with a crowbar spade. Oyster shells were thrown into the trenches, and with the exception of muscle mud applied to the potato crop, no other manure was used except ashes. The trenches were dug fifteen inches wide. Hair-lime from the tanneries, or ashes have since been dug in around the trees, in spring, and a half bushel of tan is applied to each tree in the fall to defend them from the mice, being *first mulched*, however, for the first two seasons. Mr. A. thinks he should have lost one half of his trees had this been omitted. The previous owner (father of Mr. A.) purchased his seedlings, some thousands in all, and had them grafted during the *winter season;* they were preserved by keeping them in the cellar, and covering the roots with moist earth or sand. When quite small, the whip grafting was and still is preferred, but afterwards *cleft grafting*. The largest of these sell from the nursery at three dollars and fifty cents each.

Many would say the trees are too much crowded; indeed, the standard stocks are but fifteen feet apart; and the dwarf trees are between the rows, though so set out as to stand opposite the *spaces* and not the trees themselves. But the great peculiarity of the system adopted is, the *cutting in*, or as some would say, the annual topping down of every tree. One half the previous year's growth is taken off in the spring. By this method, the trees are kept down; winds affect them less, and they are within reach when pruning and picking the fruit. The Urbaniste is but about ten feet high, and one of this kind has twenty limbs within five feet of the ground. In 1855 no manure was used at all; this year, one half bushel of tanners' hair, with ashes, was applied to each tree.

The apple orchard exhibited the same marks of attention and thriftiness as the pear. From 300 to 400 trees, either already in, or approaching the bearing state, strike the visitor in the most agreeable manner. They stand from twenty to twenty-five feet apart.

Here then is a farm of but eighteen acres, one third of which is unavailable for ledges, yet yielding a most remunerative crop. Dr. M. employs but two men, and only about one fifth part of their time is spent among the trees; or perhaps it might amount to one half of one man's time. The hay field, the garden, the strawberries, raspberries, &c., require the remaining time.

There is one object of interest upon this farm deserving the attention of the learned; indeed, some eminent geologists have already been to visit it. It is a *glacial groove*, or rather two of them, in a solid ledge, one of them having once been a hundred feet long, but now broken up in part. The conjecture is, that it is the effect of long wearing of the ice, in some remote age of the world. Such appearances are found among the Alps, but rarely in our country.

In concluding the account of this farm, it may be remarked that fruit raising is highly profitable when well managed. The doctor relieves himself for a portion of every day's heavy professional duties, to labor among the trees. No physician ever watched the varying symptoms of the patient more assiduously than he does the appearance exhibited in this orchard. And why should it not be so? As we said before, it must pay.

The many noble farms in the north part of the county, as well as those of Gen. Sutton, Dr. Loring of Salem, Mr. Fay of Lynn, and Mr. Loring and Mr. Haven on the shore of Beverly, whose farm buildings are "the best arranged that can be found perhaps in New England, taking them together," all these must be omitted for want of room.

The farm of R. S. Rogers, of Salem, is in the highest style of the art. The buildings are surpassingly fine. One feature of Mr. R.'s method may be briefly sketched as follows:

"He has succeeded in testing the value *of mud from the bottom of a goose and duck pond*, — a fact which will afford a treat to those who keep poultry of this kind. An artificial pond, of moderate dimensions, kept partially filled with muck and soil, would accommodate large numbers, and the deposits must be of the

richest kind. Mr. R. top-dressed ten acres from his pond. At first, either the year before the first application of the mud, or the same year, it is not certain which, the product was *eight and one half tons;* the next year nineteen tons, and now *thirty.* Says Mr. R., 'I intend to put all my land into grass, and hereafter have no hoed crops at all.' "

Does the County advance in Agricultural Wealth?

This inquiry is by no means unimportant in a sketch of its agriculture. The statistical tables, although not perfectly reliable, and indeed sometimes far from being so, are the only means by which even an approximation can be made. Inasmuch as the same influences would seem to be in operation when giving an account to the selectmen of the town of the products of a farm from year to year, to wit, that of subjecting one's self to heavy taxation by rendering an account of crops unwarrantably large, and that, on the other hand, of the power and duty of the selectmen to *doom* in case of suspected untruthfulness, we may take the tables with tolerable confidence in their accuracy. The importance of listening to the returns made to the Legislature will be seen by the following extract from the Report of the Valuation Committee to the Legislature in 1851: "It will be seen that although there have been added to the lands under improvement, since 1840, more than 300,000 acres, and although the uplands and other mowing lands have been increased by more than 90,000 acres, or nearly 15 per cent., yet the hay crops have increased only three per cent., showing a relative depreciation of 12 per cent.; and although the tillage lands have been increased more than 40,000 acres in the same period, yet there has been no increase in grain crops, but an absolute depreciation of 600,000 bushels; and although the pasturing lands have been increased by more than 100,000 acres, yet there has been scarcely any augmentation of neat cattle; while in sheep there has been a reduction of more than 160,000, and in swine more than 17,000."

The foregoing extract from that Report naturally stimulates

inquiry in regard to Essex County. Does it advance or recede?

The population of Essex in 1845 was 94,987. In 1855 it was 151,018; an advance of sixty per cent.

In relation to a few of the products of industry, the following results have been obtained from the statistics of 1845, as compared with those of 1855: —

I. — Indian Corn.

In Beverly the crop, as returned in 1855, exceeded that returned in 1845 by	649 bushels.
In Georgetown	1,151 bushels.
In Hamilton	5,150 bushels.
In Haverhill	26,659 bushels.
In Ipswich	6,643 bushels.
In Manchester	1,140 bushels.
In Methuen	673 bushels.
In Middleton	434 bushels.
In Newbury	3,977 bushels.
In Newburyport	4,580 bushels.
In Rowley	1,620 bushels.
In Salem	190 bushels.
In Saugus	2,273 bushels.
In Wenham	73 bushels.
In West Newbury	5,127 bushels.
Total	60,339 bushels.

In the same years, the following towns raised less corn, to wit: —

Amesbury, less by	669 bushels.
Andover, less by	6,979 bushels.
Boxford, less by	2,502 bushels.
Bradford, less by	2,128 bushels.
Danvers, less by	1,429 bushels.
Essex, less by	1,826 bushels.
Gloucester, less by	471 bushels.
Lynn (including Nahant), less by	1,836 bushels.
Lynnfield, less by	219 bushels.
Marblehead, less by	196 bushels.
Rockport, less by	1,440 bushels.
Salisbury, less by	384 bushels.
Topsfield, less by	261 bushels.
Total	20,340 bushels.

Thus showing an increase of Indian corn, in ten years, of 39,999 bushels.

The potatoe crop in the same ten years fell from 515,431 bushels to 280,311, — a falling off of 235,121 bushels. This reduction was largely owing to the potatoe disease.

The hay crop of Essex County stood, by statistics of 1845, at 55,907 tons; by statistics of 1855, at 57,960 tons, — a gain of 2,053 tons.

The number of sheep, by the statistics of 1845, was 4,892.

In 1855 the number of sheep had fallen to 2,217.

The number of neat cattle in 1845 was 21,166; in 1855 the number was 21,073.

The number of horses in 1845 was 5,140; in 1855 it was 7,099, — an increase of 1,959.

The number of swine in 1845 was 10,090; in 1855 but 3,369.

The amount of milk sold at market in 1845, was 264,744 quarts; in 1855, it was 1,811,936, — an increase of 1,547,192 quarts. Butter in 1845, 602,611 pounds; in 1855, 503,783 pounds. Cheese in 1845, 205,389 pounds; in 1855, 78,463 pounds.

A correct knowledge of the value of products cannot be obtained from the Statistical Tables of 1845 and 1855, unless the fact is perceived that the same products are valued higher in 1855 than by the Tables of 1845. Thus the 10,090 swine of 1845 are valued at $104,834, while the 3,369 of 1855 are valued at $54,209, whereas, *at the same price per animal*, the value would have been but $34,960. So also the 4,892 sheep of 1845 are valued at $9,245, while the 2,217 sheep of 1855 are valued at $6,263, when by the same price per animal the value would have been but $3,990. The neat cattle in 1855 were fewer in number than in 1845, by 93, but are valued by the returns higher by $237,550. The true gain in horses is $106,525, but it is put down at $371,954. The value of the hay crop for 1855 is given at $846,019, whereas at the same price per ton as in 1845, it would have been but $501,354. The columns in the tables, therefore, under the word "value,"

are fallacious, where the object is to ascertain the progress made or the loss sustained in respect to the value of agricultural products. It is simply a *marking up of the goods on hand,* and in trade it is quite a different thing from having a *greater number of the goods themselves.*

In order to answer the question, however, whether the wealth of the county advances, though it is a vital one, yet an extended examination would be necessary, such as would be incompatible with the object of this essay. The statistics referred to are of sterling value, attended nevertheless as they are, with imperfections from their nature incurable. Thus the inquiries of the marshals when taking them relate usually to the products of one year, and *that*, the year immediately preceding the one on which they are taken, and by no means cover the whole time between the years of taking. Again, the information given to the marshals even for one year is often most unreliable. Few, comparatively, are willing to believe that it has *nothing to do with taxes* for five or ten years to come. And then, the statistics sometimes return *values* instead of *quantities*, and the values vary from time to time, as seen above; and when the quantity of a crop is given, or is intended to be given, the year to which it refers may have been an exception to all other years. These and many other difficulties, some of which are noticed above, are real, and though some of them can be cured, others, from their nature, are insuperable. No attempt is made to ascertain the amount of produce brought in to the county or carried out. A perfect system would embrace both these points as indispensable.

It is not intended, however, to disparage the noble efforts of the State in obtaining reliable statistics. When the volume for 1837 appeared in London, Mr. Webster was struck with the effect of it upon English capitalists. Massachusetts could obtain loans on the strength of that book when no other State could. Mr. Superintendent De Bow's description is so true, that an extract from it will not be deemed out of place. "This State (Mass.) is in advance of every other in

the extent and accuracy with which it presses statistical investigations, and is worthy of all praise. Nothing is too minute to escape attention, and among her citizens are the very first statisticians of America." *

Geology and Agriculture an occasional Common School Study.

As education must be the basis of all real progress in agriculture, it is proper to glance at the common schools of the county, as affording preparation for the farm.

The number of schools in the school year of 1839 and 1840, was 277, with an average attendance of 10,581. This number of schools advanced in the following ten years to 392, with an average attendance of 17,412; and in the nine years ending with 1858–59, to 481 schools, with an average attendance of 20,056. The average length of the schools also advanced from seven months and twenty-one days in 1839 and 1840, to eight months and fourteen days in 1849 and 1850, and to nine months and seven days in 1858 and 1859. The county valuation increase from $24,335,935 in 1838 and 1839, to $31,110,204 in 1849 and 1850, and to $56,556,466 in 1858. The amount raised for schools by taxation was increased from $56,075 in 1839 and 1840, to $96,570 in 1849 and 1850, and to $162,807 in 1859. Had the sum raised for schools by taxation increased no faster than the county wealth advanced, the sum raised for schools would now have been but $130,297 instead of $162,807, as above; showing that the schools have risen in favor to the amount of $32,510 in advance of the means. This has occasioned an addition to the length of the schools, in the aggregate, of six hundred and fifty-four

* Since the above was written, an examination of the statistics for 1860, shows them to be far less valuable than those of 1855. By the law of that year (1855), information was required relating to some two hundred and thirty topics of various kinds. Now, less than ninety, and among others the important products of the dairy are entirely omitted, as well as the products of the field and garden.

months, or seventy-two years of nine months in each year. It is true, and it gives pain to record it, and should give pain to read it, that while the number of persons in the county between five and fifteen years of age is 28,822, yet only 20,-306 attend the schools, notwithstanding 3,209 under five and over fifteen years of age also attend, revealing the fact that 11,725 of suitable years for attending, and really due at the schools, *are not found there.*

It might not be considered in good taste, in a sketch of the geology and agriculture of the county, to drop even a hint relating to the studies of the common schools ; but could a small fraction of time be devoted weekly to giving popular views of these two branches of study, so far at least as to exhibit and name the different rocks so perfectly familiar to the sight, but regarded by the children as made only to throw at the birds, how soon would every school house have its collection of minerals, and the geological alphabet quartz, feldspar, mica, talc, hornblende, argillite, limestone, gypsum, and chlorite, become as familiar as the more common alphabet of the spelling-book! And how would the tedium of the school-room be relieved, and how often would the rod be laid aside or burnt, if the teacher should be encouraged occasionally to analyze a sod in presence of the scholars, at least by the inexpensive method described by Dr. S. L. Dana, requiring, as he says, "no array of apparatus, nor delicate experimental tact, but one which even the country gentleman may apply with very great accuracy, and which is perfectly within the reach of any man who can drive a team or hold a plough," and yet so effective as to detect the soluble and insoluble geine, the salts and granitic sand, together with the absorbing power and specific gravity! *

* The subject of Agricultural Education, second in importance to no other whatever, has been treated in a former number of this journal (Vol. 1, New Series, part 2, 1859), in an article which should be reprinted and sent out gratuitously to every town, village, and school district.

Meteorology.

The great length to which this sketch has already extended, precludes the possibility of treating this subject as its importance demands.

The following tables, prepared by Asa Lamson, Esq., of Salem, giving the quantity of rain which fell in the years 1850 to 1860 inclusive, and the mean heat, together with the coldest morning and the warmest noon in each month, from 1857 to 1860 inclusive, are submitted with great confidence. Mr. Lamson is proverbial in this county for the accuracy and the extent of his meteorological observations.

Amount of Rain at Salem for each Month, from 1850 *to* 1860 *inclusive, given in Inches and Hundredths, the same including Melted Snow:* —

Months.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.
January	5.40	1.19	4.75	2.60	3.00	7.50	3.37	4.41	2.65	5.56	0.85
February	2.25	4.12	3.05	5.50	4.43	3.87	0.95	1.57	1.87	3.43	1.91
March	4.87	2.50	3.64	1.88	3.15	1.40	0.95	2.18	1.39	6.18	2.00
April	4.50	7.12	7.33	3.72	5.20	4.72	4.22	6.60	4.87	2.52	1.15
May	7.17	4.59	1.64	6.57	2.94	1.20	5.33	4.45	3.02	2.75	1.88
June	2.34	2.50	3.29	0.36	1.84	1.72	3.62	1.91	7.28	6.22	5.35
July	2.25	1.78	1.75	2.95	2.75	2.91	2.94	6.27	4.21	3.02	6.40
August	4.56	2.73	6.31	10.08	0.13	2.52	11.12	7.07	6.80	5.25	4.04
September	5.16	3.03	1.60	4.32	3.72	1.68	4.15	1.75	4.75	4.17	7.38
October	3.17	4.88	2.61	3.34	2.24	5.00	2 63	4.02	2.41	3.93	2.64
November	3.61	5.31	3.92	5.22	7.84	4.66	3.15	2.15	2.67	3.80	5.43
December	5 75	2.20	3.45	4.50	4.50	5.22	3.73	5.00	4.20	5.30	5.42
	51.03	41.95	43.14	51.04	41.74	42.40	46.16	47.38	46.12	52.13	44.45
Snow	44.	44.	63½	48.	55.	44.	46.	47.	26½	41½	27¾

Average amount of Rain for ten years, 46.31 inches, and the eleven years' average is 46.14 inches. The eleven years' average of Snow is 44¼ inches. Average of Rain for the previous seven years from 1843, was 40.23 inches.

Table of Mean Heat, also giving the coldest Morning and warmest Noon in each Month, Observations being made at Morning, Noon, and Evening.

Months.	1857.			1858.			1859.			1860.		
	M. H.	Lowest.	Highest.	M. H.	Lowest.	Highest.	M. H.	Lowest.	Highest.	M. H.	Lowest.	Highest.
	° ′	°	°	° ′	°	°	° ′	°	°	° ′	°	°
January ...	16 36	16	38	32 17	4	52	26 08	15	50	28	5	50
February ..	33 33	5	65	23 68	0	44	29 20	6	46	26 60	7	50
March.....	32 67	8	62	32 90		61	38 12	8	56	38 17	20	68
April.....	41 84	15	62	45 25	28	68	42 88	24	68	44 84	17	66
May.....	54 25	34	83	52 42	36	73	57 33	34	87	55 11	36	85
June.....	63 11	44	84	67 66	48	88	63 33	40	95	65 20	47	88
July.....	71 14	47	91	69 55	54	95	69 84	49	88	67 67	50	86
August	68 12	58	85	64 44	46	83	68 07	46	86	69 50	52	88
September.	62 04	34	85	61 88	37	84	58 67	36	75	59 55	34	82
October....	50 67	27	72	53 60	31	76	47 67	24	78	51 05	28	69
November..	42 50	14	65	36 50	18	62	42 03	26	63	44 25	17	62
December..	34 25	28	52	29 33	8	58	25 33	9	63	27 58	2	45

"The dash underneath figures denotes *below zero.*

"The mean heat of the first 25 days of the present August (1860), is about 1° warmer than the corresponding time in last year; and the range is from 52° to 86° between the coldest morning and warmest noon in that time. We have 3.92 inches of rain in the time to Saturday noon.

"August was the warmest summer month in 1860, — something unusual.

"My observations were made three times a day on eight months of each year, viz: at 6 A.M., noon, and 6 P.M., and for four months of each year, at 7 A.M., and 5 P.M."

As respects the quantity of *rain*, Mr. Lamson remarks: —

"It is very remarkable that in the first five months of 1860, there was but 7.79 inches of rain, while in the last seven months there was 36.66 inches. Average of the first five months of the ten previous years was about 19 inches; and the least quantity in that time was in 1856 and 1858, namely: 14.82 inches in 1856, and in 1858 it was 13.80 inches.

"The average of rain on each of the first five months of the years 1850 to 1860, was as follows, viz: —

In 1850	24.19 inches.	In 1855	18.69 inches.
1851	19.50 "	1856	14.84 "
1852	21.41 "	1857	19.21 "
1853	20.27 "	1858	13.80 "
1854	18.72 "	1859	20.24 "

Table showing the Number of Days during which there was either THUNDER *or* LIGHTNING, *or both, furnished by* MR. LAMSON, *the Record having been kept by him, viz:—*

In 1850	37 days.	In 1856	34 days.
1851	32 "	1857	33 "
1852	29 "	1858	39 "
1853	28 "	1859	21 "
1854	32 "	1860	25 "
1855	21 "		

Average, 30 1-11 days.

The Time of the opening of some of the Flowers, and the Return of some of the Migratory Birds. Furnished by ASA LAMSON, ESQ., *of Salem.*

1857.

Feb'ry 22.	Snowdrop.
March 16.	Bluebird.
" 17.	Crocus.
April 5.	W. B. Swallow.
" 23.	Tree Sparrow.
May 1.	Barn Swallow.
" 12.	Bobolink and Golden Robin.
" 25.	Lilac.
June 20.	Locust blooms.

1858.

March 15.	Snowdrop.
" 17.	Bluebird.
" 29.	Crocus.
" 31.	W. B. Swallow.
April 16.	Tree Sparrow.
" 25.	Barn Swallow.
May 7.	Peach and Cherry.
" 10.	Golden Robin.
" 12.	Bobolink.
" 24.	Lilac.
June 20.	Locust blooms.

1859.

March 7.	Snowdrop.
" 13.	Bluebird.
April 7.	W. B. Swallow.
" 17.	Tree Sparrow.
" 27.	Barn Swallow.
May 4.	Peach and Cherry.
" 8.	Golden Robin.
" 13.	Bobolink.
" 21.	Lilac.
June 16.	Locust blooms.

1860.

Feb'ry 23.	Snowdrop.
" 28.	Bluebird.
March 31.	W. B. Swallow.
April 16.	Tree Sparrow.
" 27.	Barn Swallow.
May 3.	Cherry.
" 9.	Golden Robin.
" 11.	Bobolink.
" 18.	Lilac.
June 16.	Locust blooms.

Statistics for the Year 1860.

Land under Cultivation in 1860, *with Produce of the same. Also, unimproved Land, &c. Also, Cattle, Horses, and other Stock.*

		Tons of hay, the yearly produce of the same.
Acres of land annually tilled, excluding orchard tilling	17,335	
Acres of orcharding of all kinds of fruit	3,307	
Acres of upland mowing, excluding orcharding mowed	41,124$\frac{3}{8}$	39,476$\frac{1}{2}$
Acres of orcharding mowed	1,841$\frac{5}{12}$	1,548
Acres of fresh meadow	13,947	10,188
Acres of salt marsh	15,826	13,792
Acres pasture land, excluding orcharding pastured	94,658	
Acres of woodland	46,730	
Acres of unimproved land	27,529$\frac{11}{16}$	
Acres unimprovable	6,734$\frac{3}{8}$	
Acres owned by towns or other proprietary	1,431$\frac{1}{4}$	
Acres used for roads	8,216$\frac{5}{8}$	
Acres covered with water	17,574$\frac{1}{4}$	
Acres from actual survey in aggregate	237,469$\frac{1}{2}$	
Horses one year old and upwards	8,039	
Oxen four years old and upwards	4,027	
Cows three years old and upward	13,240	
Steers and heifers 1 yr. old and upward	4,278	
Sheep six months and upward	1,717	
Swine 6 months and upward	6,245	

Farm Products for 1855, (being the latest returns made.)

	Bushels.	Value.
Indian Corn	147,730$\frac{1}{2}$	$232,034 90
Wheat	1,260	2,466 00
Rye	16,192	20,258 25
Barley	18,139	15,339 30
Oats	28,020	18,489 90
Potatoes	290,311	236,878 75
Onions	176,640	147,136 00
Turnips	26,384	8,471 00
Carrots	202,160	18,861 55
Beets and other esculent vegetables		45,278 50
All other grain and root crops		55,691 75

	Number.	Value.
Apple-trees cultivated for fruit	239,127	$166,905 65
Pear-trees cultivated for fruit	27,023	12,227 45
Cherries, nuts, berries, and other fruits, not included above		16,952 00

Hay.	Tons.	Value.
English hay	36,393¾	$654,432 00
Meadow hay	10,124½	83,904 00
Salt hay	11,422	107,683 00

	Value.
Cranberries, 370 acres of meadow	$8,488 00
Milk, 1,811,936 quarts	94,591 93

Essex Agricultural Society — Treadwell Farm — Concluding Remarks.

The Essex Agricultural Society was instituted in 1817, and issued the first number of its Transactions in 1818, containing Col. Timothy Pickering's Address. With the exception of 1824, 1826, and 1827, when the Reports of Committees, &c. were published in the New England Farmer, the Society has never failed annually to publish its Transactions, making a pamphlet of from 27 pages in 1818 to one of 200 in 1856. Of the 1,694 members of this Society, 562 have deceased, while only 76 are marked as having removed from the county, leaving 1,056 acting members, as appears by the printed list, every town in the county being represented. Gentlemen of all the learned professions are found among the officers and members, and although the Society is composed chiefly of the substantial yeomanry, yet it is believed the time has never been known when men could not have been found upon the catalogue who could either "write an episode or knock down an ox," thus realizing Addison's ideal of a *man.*

The Library of the Society, kept in the rooms of the President at the Court House in Salem, contains some 700 volumes, besides a large number of agricultural and other publications and pamphlets, and is accessible to the members at all times without fee. All ordained ministers of the gospel resident within the county, and all editors of news-

papers published in the county, are entitled to the privileges of the Library. The members of the Society receive a copy of the Transactions annually. No member is subject to any assessment. The price of membership is but three dollars.

The funds of the Society, consisting chiefly of bank and railroad stock, amount to $8,396, exclusive of the Library and the Treadwell Farm.

Essex has but one Agricultural Society, it is true; but Agricultural Libraries are being established, and Farmers' Clubs formed, in many towns.

The Treadwell Farm.

Of the Treadwell Farm, already mentioned, it is proper though not easy to speak. The will of the testator, Dr. John G. Treadwell, late of Salem, conveying this farm of 150 acres of land with buildings, upon certain conditions, took effect in 1858. It was given "for the promotion of the science of agriculture by the instituting and performance of experiments and such other means as may tend to the advancement of said science;" with the proviso, however, that "if said Society should refuse to accept said farm, or should appropriate it at any time to other purposes than those above stated, or if the whole or any part of said farm should be sold, given away, exchanged, or in any manner parted with by said Society, the whole of said farm shall be forfeited by said Society;" and in such event it is to go to the Massachusetts General Hospital Corporation and their successors forever.

The wisdom and wit of the Committee of the Trustees were taxed to their utmost limit to decide whether such a gift, loaded with such conditions, should be accepted by them at all, and if accepted, then to adopt the most feasible mode of managing it, so as to come fairly within the wishes of the testator, and yet so as to prevent decided loss to the Society; "the land being," in the language of the Committee, "in the lowest possible condition, with the exception of the pastures and a small field adjoining the house," — requiring "a long

application of good farming before it will really warrant any system of experiments on crops with the prospect of such a return as every careful and intelligent farmer has a right to expect." In this state of things, the Committee, in November, 1859, recommend that the attention of the Society be turned to the repairs of the buildings and the improvement of the land, preparatory to a series of experiments in the raising of crops. They also obtained a set of meteorological instruments and tables from the Smithsonian Institution. The "dilapidated condition of the barn" made it necessary, in 1860, to take measures for the erection of a new one, a measure indispensable for the well managing of the farm, yet requiring funds where no funds were. "Most of the land, also, proving to be light, sandy, and beachy, and having been scantily manured for many years," it became almost certain that, having taken the farm, the Society would be obliged to create something out of about nothing. The indefatigable Committee have entered upon this labor, however, and in due time will work out the problem, it is believed, to universal satisfaction.

Concluding Remarks.

Notwithstanding the great variety of topics yet untouched, I am admonished, by the length to which this essay has extended, that it must be brought to a close. I by no means claim to have given a connected view of the agriculture and geology of the county, although that was the original intention. Notwithstanding my somewhat extensive and most agreeable explorations, it is but too true that very much land yet remains to be explored. Many thanks are due from me to the gentlemen who have so promptly responded to the printed questions sent to them, as well as many others who have replied to letters addressed to them, and still others who have devoted their time and lavished their hospitalities, or kindly offered so to do. I have long and interesting communications on hand from gentlemen who are well entitled to be heard, but which are crowded out for want of room.

Agriculture, it may be said, in the eloquent words of a fine writer upon another topic, "takes or should take the character of an endless experiment. It is an ever unfinished enterprise. The hopes of its true-hearted friends run before their performance, and their anticipations are not realized. Its processes are all tentative. It works by an open pattern. A suspicion, which is probably wholesome, haunts us all that there is something secret about it not yet found out. An undertone of criticism, if not of complaint, runs through many of our reports. Greater things are felt to be in its possibilities than its achievements, and the heart of every workman in it, whether scientific or practical, that is worthy of his place, prophecies a future for it far better than the past."

Prize Essay on Farm Management.

We have been induced to transfer the following article from the sixty-seventh number of the Journal of Agriculture, and the Transactions of the Highland and Agricultural Society of Scotland, because it is a very clear and concise statement of a system of farming but little known and practised here, but which has placed Scotland in the front rank of successful agriculture. We hope every one will read it with critical care and attention. We need hardly to observe that, to reduce the figures to our currency, it only requires to be carried in the mind that the pound (£) represents five dollars, the shilling twenty-five cents.

Farm Management: Report on a Mode of Managing a Farm, affording an Example of High Farming combined with Profit.

By Alexander Simpson, Teawig, Beauly.

[Premium — The Gold Medal.]

In presenting the Report contained in the following pages, the writer is not prepared to say that its contents elucidate (in the words of the Society's Premium List) "the *best* mode," — he is satisfied with offering a report describing *a* "mode of managing a farm, affording an example of high farming combined with profit."

To entitle a report on this subject to consideration and confidence, I believe that what is required is not an estimate of *probable* returns from *supposed* expenditure (these, when tested by experience, almost always prove fallacious), but a *bona fide* return of the expenditure and receipts of a farm in working order. This I give in a form which I conceive will be intelligible to the reader least conversant with book-keeping, while I believe it will be received by those versed in figures as a fair business statement of the accounts of a tenant farmer. As such, indeed, I confidently present it. Not unacquainted with business prior to engaging in my present occupation, I keep regular accounts as a matter essential to farming as to every other business; and the profit-and-loss account presented at pages 386–389, is simply a transcript of my own books, with the exception of one entry, which I have, for reasons fully explained, amended.

The accounts given are those for the crops of 1856 and 1857. Situated as my farm is, on the northeastern coast of Scotland, I shared fully in the disasters attending the harvests of those years, which will long live in the memory of Scotch farmers. Much corn was totally lost by the opening up on the fields of the drenched stooks, more was deteriorated to a large degree by discoloration and sprouting; while the harvest-work, being protracted, was necessarily expensive. The potato disease was also very destructive in its effects during both years. An exposition of the results of these two years is, I feel, putting profitable farming to a most severe test, — a test which, perhaps, in general, it could not stand, and which, in my own case, it does stand only from my following a more diversified system of cropping than that afforded by the standard four-or-five-course shift.

The total acreage on which I report is 313: of these, 4 are occupied by houses and buildings, and 10 by banks and belts of plantation, not capable of cultivation, and of little or no value for pasturage, leaving 299 acres of arable land, which were cropped as follows in the years 1856 and 1857: —

	1856. Acres.	1857. Acres.
Wheat	69	82
Barley	39	12
Oats	32	50
Total cereals	140	144
Beans	0	5
Potatoes	24	27
Do for cottars, &c	3	2½
Mangold	0	1½
Turnips	57	38
Turnips sown for seeding	5	14
Turnip seed	0	5
Fallow after turnip seed	8	0
Tares for cutting	0	2
Grass in rotation	54	53
Do. in permanent calf, &c. parks	5	5
End ridges, and uncropped	3	2
	299	299

The Expenditure and Returns for the crops of these years are given in the ollowing account current:—

Dr. FARM. CROPS 1856 and 1857.

1856.				
June 1.	To valuation of live stock, viz:—			
	Horses	£262 0 0		
	Cattle	52 10 0		
	Sheep	134 15 0		
	Pigs	36 0 0		
			£785 5 0	
1858.				
June 1.	To purchases of Horses	£98 15 0		
	Cattle	137 5 0		
	Sheep	100 19 9		
	Pigs	8 14 0		
			345 13 9	
	To cattle-feeding stuffs purchased		97 13 8	
	To general farm expenditure for two crops under the following heads, viz:—			
	Rental	975 7 2		
	Rates and assurances	43 1 10		
	Yearly servants' wages	240 8 0		
	Do. provisions	308 15 2		
	Labor by outworkers	370 15 0		
	Seeds of all descriptions	500 11 0		
	Manures	413 16 9		
	Bran, &c. for horses*	71 12 0		
	Tradesmen and charges	215 19 5		
	Implements purchased	56 4 9		
	Improvements and lime	130 2 10		
			£3,326 13 11	
	To two elevenths of expense of improvements of thrashing-mill in 1856.— See page 185		9 12 3	
	To crop 1858 — Rental and charges on 14 acres turnip seed, harvested July, 1858, proceeds to crop 1857		35 0 0	
			£4,599 18 7	
	To balance, being profit on the investment, including interest on capital		548 16 2	
			£5,148 14 9	

* This head does not include home-grown corn used for horses. Bran is used to a large extent as food for the working horses. The lighter oats go for feeds when at full work; and tail barley and wheat for boiled messes. On these, and on the grass, tares, and hay used, it would be difficult to set a value; indeed, practically, it would be difficult to give an exact account of the quantities consumed; and as they are used up in working the farm, an account of them would only be useful to show the gross produce, but would not in any way affect the balance-sheet.

Cr.	CROPS 1856 and 1857.	*Contra.*	
1858.			
June 1.	By cash sales during two years — of		
	Cattle	£412 9 1	
	Sheep	224 8 1	
	Pigs	138 9 2	
	Total live stock		£775 6 4
	Wheat	£984 18 10	
	Barley	478 4 9	
	Oats	269 2 3	
	Total corn		1,732 5 10
	Potatoes	£457 1 1	
	Turnips to sheep	133 6 10	
	Turnip seed	337 10 10	
	Grass, hay, &c	40 7 9	
	Dairy of 12 cows	122 11 9	
	Total for green-crop land		1,090 18 3
	Total cash sales		£3,598 10 5
	By corn, &c. &c. used for seed, servants' provisions, and household supplies,* under the following heads, viz: —		
	Wheat	£164 12 3	
	Barley	13 8 9	
	Oats	202 6 10	
	Beans and tares	6 17 6	
	Potatoes	159 3 8	
	Turnip seed, and rent of land occupied by	32 8 0	
	Rye-grass seed	10 14 0	
	Dairy	63 3 4	
			£652 14 4
	By valuation of live stock, viz: —		
	Horses	£320 0 0	
	Cattle	410 0 0	
	Sheep	140 0 0	
	Pigs	27 10 0	
			897 10 0
			£5,148 14 9

* The total amount included under the head "Household Supplies" does not exceed £50 in two years, so no great error in over-estimation can have been made. The provisions used in kitchen are all charged to "Servants' Provisions," per contra; and the portion used by the female servants is considered to meet the value of their services in dairy work, their money wages going in cash book to the account of "Household and Personal Expenditure."

The foregoing account might be epitomized as follows: —

Dr. FARM.				CROPS 1856 and 1857.				*Contra.*				*Cr.*
To ordinary expenditures for 2 years, as follows, viz: —								By produce for two crops of				
Rental, rates, &c.	£1,018	9	0					Wheat.....	£1,149	11	1	
Labor, tradesmen, and charges.....	1,135	17	7					Barley.....	491	13	6	
Seeds.....	500	11	0					Oats (besides horse corn).....	571	9	1	
Manures.....	413	16	9					Total cereals..				£2,112 13 8
Depreciation in value of, and food bought for horses.....	112	7	0		£3,181	1	4	Beans, hay, &c...	£57	19	3	
To extraordinary expenditure, viz:								Turnips to sheep *	133	6	10	
Implements.....	£65	17	0					Potatoes.....	616	4	9	
Improvements and lime.....	130	2	10		195	19	10	Turnip seed.....	334	18	10	
Total expenditure.....				£3,377	1	2		Profit on live stock (deducting purchased food)....	670	14	0	
To balance for profit and interest.....				548	16	2		Total grass & green-crop land				1,813 3 8
				£3,925	17	4		Total returns				£3,925 17 4

The purchased manures amount to 14s. per arable acre per annum. Including purchased feeding-stuffs, the expenditure amounts to within a fraction of 20s. per arable acre per annum.

This is a rate of expenditure which may fairly be held to characterize a system of "high farming;" and the writer is rather inclined to exceed than to fall short of a similar liberal expenditure in future years.

The gross returns are.....	£6	11	3	per acre	per annum
The rental is..... which, when the soil, &c. as described in pp. 392–395 are taken into account, will be considered a high rate.	1	12	7	"	"
The residue to the tenant is.....	0	18	4	"	"

The foregoing accounts are not accounts "cooked" for the occasion, but, as has been already stated, are faithfully taken from the business books of the farm, and were kept without any view to their condensation into a published statement.

Having thus given, in accordance with the requirements of the Society, an account of "*the expenditures and returns*" of the farm reported on, I now proceed to explain, also in accordance with those requirements, "*the mode of accounting*" which I follow.

It is very simple. The term of old Whitsunday (for convenience say 1st June) is the time of balancing the year's accounts. By this time the corn of the past season is all thrashed, and either sold or in granary. It is not valued over to the

* Sold to be fed to sheep on the land.

next crop, the actual returns, when sold, being the credit to the crop it belongs to. The winter stock of cattle, sheep, &c. are then either sold, or valued and turned over to summer grazing.

The seed-corn, &c. sown, is credited to the past, and charged to the incoming year at its fair value, as will be seen at the debit and credit of the foregoing balance-sheet.

The farm work performed, the manure and straw, are not brought into account. Transferring accounts of tillage, &c. from one year to another, is an unnecessary complication, as there can be very little difference between one year and another, under one system of management; and the valuing of ploughings, cross ploughings, harrowings, and grubbings, only serves to confuse and mislead, except in the case of a change of tenancy. In like manner the stock of straw and manure, at any particular period, varies but little from year to year.

Implements, also, do not require to be annually valued; for it will be found that to keep up with the improvements of the day, new purchases must be made to an extent sufficient at least to balance any percentage that would be required for deterioration on the old stock. It will be observed that £56 4s. 9d. were thus expended during the two years reported on; and here it may be observed that, so strictly had this rule been observed that an amount of £52 18s. 6d. paid for attaching horse-power machinery to the water thrashing-mill, was charged against the then current year (1856); but on further consideration it appeared but right that this charge should be spread over eleven years,—the unexpired term of the lease,—any sum to be received at its termination for the machinery being considered as equivalent to the compound interest on the expenditure.

Improvements effected during the year are also put down to current expenditure, not capitalized. Such will, in the ordinary operations of a farmer, be found necessary in the way of additional draining, or making up defects in that already executed, and in additions to, or alterations in office-houses. These *ought* to be done by the landlord, but, practically, during the currency of a lease they generally fall on the tenant. For such, and for the improvement of the land by liming, it will be seen that a charge of £65 per annum has been incurred.

There remains to be noticed the valuation of live stock.

Horses may, in some sense, be considered as part of the outfit of the farm, and might be classed as part of the "Capital Account." But considering that, on the one hand, deterioration by age necessarily does occur, and that considerable deterioration may take place from accident or disease; and, on the other hand, that by rearing young horses the value may increase instead of diminishing from year to year, irrespective of purchases made, it becomes necessary to revalue them at stock taking, in the usual way, before striking a balance.

In regard to the other descriptions of live stock, there can, of course, be no question as to that being the plan to be followed. In affixing a value to the live stock, every care has been taken to arrive at a fair value; and as the foregoing accounts were made up for private use, and not for publication, there could be no object but to make them as accurate in this respect as the judgment of the writer would allow, without calling in the assistance of others. When the valuation is made, he has as clearly in his view the profit and loss account of the crop growing, as of that closing, and hence the scales are held equal. In the employment of valuators, the same

knowledge of the stock, its capabilities or antecedents, could not be expected, — the same individual could not always be secured, and a difference of judgment, caprice, or inattention, might occasion discrepancies in valuation which would be very embarrassing to one keeping accounts as has here been done, not with a view to publication, but for his own information and guidance.

It is doubtless somewhat bold in a tenant farmer, of whose lease a considerable portion has expired, thus to come forward with not only the statistics of his occupancy, but also with full details of its money results. I believe, however, that by the close and jealous reserve generally observed by those of my profession in this last respect, a great deal of misapprehension is occasioned. I believe that landowners are more disposed to over-estimate than to under-estimate the profits of farming. The figures given above can do no harm in our relations with them; they show, as will be seen hereafter, but a very moderate percentage on capital invested. Again, tenant farmers, from the want of keeping accounts, are apt to under-estimate their profits. Because the "balance in the banker's" is not increased from year to year, they are apt to conclude and to assert that "farming is a losing business," although in the mean time their personal and household expenses have been defrayed, and in most cases a progressive improvement has gone on in the value of their stock, and condition of their occupancies.

But it may be said that I have not given a fair view of the results obtained by myself, and therefore no correct *data* for estimating those of others, from having selected as my years of exposition two in which bad harvests were experienced. But here there were compensating influences at work. "Necessity is," proverbially, "the mother of invention;" and the urgency of rent-day, and labor and manure-bills, causes expedients to be resorted to, which, in more prosperous times, would not be thought of, or, if thought of, put aside as "troublesome." Thus, sprouted grain may put pigs more forward in the balance-sheet than they would otherwise have been; damaged straw may cause the opinion that cattle will not make much of the turnips to be given in connection with it, and these turnips may be turned to an account in raising turnip seed, which tells in the balance sheet, and at the factor's audit; a failure in the potato crop may make a particular variety, which has comparatively escaped, a matter of profit from seed demand, considerably beyond the ordinary rate. So important were those influences in the years reported on, that I believe I would not be safe in calculating for future crops, — exempt from harvest disasters and potato failure, — a much larger balance to the credit of the profit-and-loss account than has been given above; a balance which, as already stated, will be found a very moderate return on capital invested.

This brings me to consider at what that *capital* should be stated. Here I am free to confess that I experience much difficulty. As will be understood from a description of the land I occupy, to be given hereafter, a large proportion of it was entered upon when it was in the very lowest state of exhaustion. Much work, in the shape of permanent improvement, was executed in the way of draining, building office-houses, &c. Thus it was at least a full rotation before the land was even in fair working order. During this period the "Capital Account" could not, of course, be closed; and when these derangements were put right, and fair working condition arrived at, the intricate question presents itself, "When profit on capital should commence to be computed?" If from the beginning of the investment or

adventure, profit were to be added to capital, then too heavy an enhancement would be made of the "Capital Account." Moreover, impartial reconsideration of past expenditure might show that a good share of it was chargeable rather to "*inexperience*" than to "*capital.*" To disentangle these two items would be a task puzzling to the best farmer accountant, and I shall not undertake it. I believe that a fair valuation of the farming investment, as it now (October 1858) stands, is the most correct view of the "Capital Account" on which profit is computable; and I may add that, assuming the following to be a correct view of the immediately available value of the investment, — which I believe it to be, — the investment has, on the whole, turned out very fairly as to the past.

ESTIMATE OF FARM VALUATION, OCTOBER, 1858.

Live stock as at 1st June, 1858	£897	10	0
Increased value thereof, from pasturage to date	100	0	0
Implements and mill machinery	400	0	0
120 acres corn crop, average per acre, £8	960	0	0
25 acres potatoes and winter beans, per acre £15	375	0	0
6 acres mangold, per acre, £10	60	0	0
42 acres Swede and yellow turnips, per acre, £8	336	0	0
12 acres turnip seed, contract	200	0	0
Haystacks, 30 tons, £3	90	0	0
	£3,418	10	0

This is an "above-ground" valuation. An "under-ground" valuation of unexhausted manures and improvements might be entered upon; but it would be at the best but suppositive, and dependent on unknown conditions of prices. I shall, therefore, not add it to capital; though assuredly I would not part with it at less than one thousand pounds.

Assuming, therefore, that the "Capital Account" stands at the above sum of £3,418 10s. the profit for two years appearing as £548 16s. 2d.—*i.e.* £274, 8s. 1d. per annum, I have an annual return for superintendence, risk, and interest, of *eight per cent.*

This is not equal to the profit expected on capital employed in mercantile transactions, where ten per cent. is calculated upon as the fair return upon capital invested. But a farmer is engaged in what has well been termed by the wise and great Washington "the most healthful, the most useful, and the most noble employment of man;" he should, therefore, be satisfied with a less annual return upon his capital than is reaped (or expected to be reaped) by his friend who, "in populous cities pent," passes his anxious days in the whirl of commerce. He has, moreover, this to counterbalance his more moderate profits, that he has a house and garden rent free, and also a horse and vehicle, which, occasionally employed as part of his business outfit, is at all times a matter of personal and family accommodation, which, to commercial classes, it would cost a portion of their "profits from trade" to obtain.

DESCRIPTION OF THE FARM REPORTED ON.

It lies on the eastern side of Scotland, in the valley of the Beauly Frith, and on the confines of the counties of Inverness and Ross.

It consists of two separate holdings, of the respective sizes of 180 and 119 acres.

They are both held under current leases of 19 years' duration. They are situated at rather more than two miles distance from each other, and have separate steadings and resident servants; but are practically worked as one farm. Horses and servants are transferred between them as the arrangement of work may require; stock also, as the consumption of grass and winter food may determine.

There are advantages, and also disadvantages, connected with this division of the land. The first are, the less length of the cartage between the fields and the steadings, — the moderate size of the fields, averaging eighteen acres each, — and some emulation between the resident servants at each. The disadvantages consist chiefly in the dislocation of work, by the ordinary carrying on of it by two small parties instead of one larger united band. On the whole, I think that by it the item of labor in the expense account is somewhat increased, while the horsework is economized: thus, the advantages and disadvantages about counterbalance each other.

To the holding of 119 acres, situated at about twenty feet elevation above the sea level, having the river Beauly as its southern boundary, the following description and remarks, forming a part of a contribution on the subject of "Draining" to the columns of the *Agricultural Gazette* in 1855, apply: —

"A specimen of the soil and subsoil having been submitted, in the year 1845, to Professor Johnston, he furnished the following analysis, appending thereto some valuable remarks and instructions (partially quoted below), which have been of much service in directing the processes of culture and management followed out. Analysis of

		Soil.	Subsoil.
By Washing —	Clay, fine sand, and organic matter	93.07	97.12
	Coarse sand and small stones	6.93	2.88
By analysis —	Organic matter	10.10	2.44
	Alkaline salts, soluble in water	0.91	0.15
	Gypsum, sulphate of lime	0.19	Trace.
	Oxide of iron	3.32	3.70
	Alumina, soluble in acids	2.13	2.41
	Carbonate of lime	1.32	0.47
	Carbonate of magnesia	0.87	0.61
	Insoluble silicious matter	81.17	88.25
		100.01	98.03

"'*Remarks.* — It is a stiff clay soil, formed, as your geological position would intimate, from the *debris* of the mica-slate-rock, with a little assistance from the granite and old red sandstone. The proportion of oxide of iron, derived chiefly from the latter, is not excessive; and in a proper condition of the soil, properly drained, thoroughly opened, and well tilled, would add to its productive character. But I observe that this oxide has formed itself into little lumps, indicating an unwholesome condition of the soil, — that the air is not properly admitted, and that there exist among the soil particles of ochrey matter with which it will not be wholesome for the roots of plants to come in contact. The small quantity of organic matter in the subsoil would seem to imply that it has been hitherto in a condition in which very few roots would willingly descend into it. These facts all recommend thorough drainage and subsoiling as necessary to render available to the plant the different kinds of food which the soil so abundantly contains.'

"These remarks were written in July, 1845. Perhaps their accuracy could not be better supported than by the simple statement that the wheat crop of the outgoing tenant for that year was estimated by valuators at 14½ bushels per acre; an estimate which was somewhat in excess of the produce actually harvested by me, the incoming tenant. The whole farm has been thoroughly drained, and the effects are very satisfactory, — the produce being now in the aggregate fully threefold of what it was prior to draining and deep tillage, though the ochrey matter which the learned professor described as 'not wholesome for the roots of plants to come in contact with,' is not yet quite washed out or neutralized; hence the produce of wheat and oats disappoints expectation, while green crops are satisfactory.

"When I begun draining, Smith of Deanston's system of furrow draining was beginning to be accepted by the more advanced agriculturists as a proved and practical improvement; and his plan of 2½-feet drains, filled for a foot with broken stones, was the perfection of drainage engineering. Such was the system followed in the major part of the drainage I effected. My first change was to three feet depth, with eight inches of broken stones; then came tiles, with boards below for soles, and broken stones above. It was in 1848 that I put down the first pipe-tiles, three feet deep. Increasing that depth to three and a half feet, and placing 1½-inch pipe drains in the line of greatest descent, at intervals of eight yards, we attain to what may well and truly be termed 'thorough drainage.'

"Drainage on each of these systems has, I must say, been efficacious whatever preference I may give to one system over another. No water, even after heavy rain, lies for above a few hours on the least perfectly drained field. It is true that the run through the stone drains is not so rapid as it is through tiles, but those who have scanned the results obtained by one of the most skilful and successful of Scottish agriculturists, Mr. Hope, of Fenton Barns, — which are largest from land drained on what the enthusiasts for deep draining would consider very faulty principles, — are cautious about trying to make 'good better' by going again over their drained ground; therefore, I am content to allow my land stone-drained, at two and a half and three feet depth, to lie as it is."

On this holding the work done on or to the land has been furrow-draining, as above described; the building with stone conduits, and filling up of upwards of 2,000 yards of wide open ditches; the levelling of old fences and grubbing up of thickets, which formerly rendered useless five acres of ground, and impeded the straight working of the fields. These labors cost about £600 for hired labor, besides much work by the servants and horses of the farm; a part — £375 — of this was money obtained by the landlord's co-operation, under the Government Drainage Loan Act, for which the full interest of six and one half per cent. is paid by me, and classed in the accounts under the head of rental. Subsoiling, the use of lime, pure, and in composts (principally the latter); the application of guano and other portable manures, are the further means used in each year for the improvement of the soil of this holding, BUT IT CONTINUES A DEAF SOIL. Iron is still abundant "in an unwholesome condition," and practical farmers know well that such a soil is more productive of straw and weeds than of corn.

A steading, including water-power mill and milldam, was erected by me at my own expense, with the exception that wood and slates were furnished by the landlord. This, with the refitting of the dwelling-house, also done by me, cost little less than £500.

Of the other holding, 120 acres are in a flat, reclaimed by embankment from the frith. All this land is below the level of high water. The drainage water is collected in open ditches surrounding and intersecting the flat, and discharged at low water by sluices through the embankment. When the land was reclaimed about thirty years ago, it was a perfect swamp, not merely from the influence of overlying water from tides, but also from spring water; for, lying as it does immediately at the foot of a gravelly terrace of land, extending back for several miles without any natural drainage outlet, the water of filtration through this large extent rises to the surface through the flat. This rising water was originally taken from the fields into the surrounding ditches by drains formed of brushwood. These, of course, soon decayed, and were replaced by drains formed either of stones from the gravel, three to six inches in diameter, or of split trees laid triangularly together. These, again, became unsatisfactory, and are still the cause of much annoyance from frequently bursting out. Since the commencement of the present lease, the land has been gone over again, and £394 advanced by the landlord (interest on this at six and one half per cent. is also paid and included in the rental charge) has been expended in thorough pipe drainage, — the leading drains being constructed of stones, the rejected cuttings of a large red sandstone quarry in the immediate neighborhood. The outfall is so defective, even at low water, that three feet is the utmost depth that can be attained, and there is expense continually incurred by the silting up of the pipes, and the breaking out of the old wooden drains. The containing ditches are also difficult to keep clean, as the current is very languid, and water-weeds grow rapidly, and choke them.

This flat is of a peaty soil, lying on a subsoil of bluish alluvial sand, with occasional veins of diluvial clay through it; and it also is charged with an unwelcome superfluity of ochrey matter, giving it a similar character to the previous division, namely, that of "*a deaf soil.*"

The other sixty acres of this holding are on the gravel terrace, about forty feet above high-water mark. They consist of thin sharp soil, giving good returns in "dropping years," but easily affected by drought and overworking.

The buildings on this holding, including water-power mill, were completed by the landlord, and are on the whole, commodious, though they have required changes at the tenant's expense (witness £52, 18s. 6d. for horse-power machinery to mill) to suit them to his requirements.

Management.

The two divisions of 120 acres each are managed on a six-course shift, say—

1. Grass.
2. Oats.
3. Green crop: potatoes, beans, swedes, mangolds.
4. Wheat.
5. Turnips.
6. Barley or wheat: sown out with grass.

It is a rule to give a heavy farmyard manuring to No. 3 of the course, supplemented by guano or a mixture of it with dissolved bones. By the aid of composts, more or less of No. 5 is gone over with manure, and it receives a liberal supply of

manures in turnip drills. If wheat follows, that is put down with as much farm manure as can be gathered together in the autumn.

The terrace or gravel land is managed on a five-course shift —

1, 2. Grass pastured.
3. Oats.
4. Potatoes or turnips eaten off by sheep.
5. Barley.

This is a hungry soil, and swallows up much armyard manure without making much return for it. Dissolved bones are most relied on for its fructification.

The above is the general course of management, but some derangement in its rotation has been caused (as will be seen by the acreage cropping at page 386) by the practice recently followed of raising some acres of turnip seed on a contract with respectable seedsmen. That practice also involves, to some extent, the curtailment of the live stock, and a consequent increase in the manure account. In other respects I do not think it involves impoverishment of the soil. The land in the end of July is in your hands free of crop ; and that crop, as carried away, has consisted of —say 12 cwt. of seed for two years' growth. To restore the constituents of that by farmyard or artificial manure is no difficult task. You have the land cleaned and manured before the commencement of harvest work, with the rotation, as it were, at your command, to begin with wheat or whatever crop you please. I have found it advantageous on clay soil to follow a crop of turnip seed by one of winter beans. These can be sown in early autumn, so as to have well-established roots before winter sets in, and thus they ripen in July or August, and are not troublesome and precarious to harvest, as are spring-sown beans in late seasons.

The portable manures used during 1856 and 1857 consisted almost entirely of first-class Peruvian guano, and bones dissolved by myself in sulphuric acid. The quantities used were,—

	1856.	1857.
Guano—cwt.	230	76
Bones for dissolving—bushels	252	668

It will be seen by this statement that the extravagant price put upon Peruvian guano has much limited my use of it. If sold at £10 to £11 per ton, I would use it to the extent of four fifths of my expenditure, as there can be no question that it approaches nearer to a perfect manure —*i.e.* one available for every crop and every soil — than any other

The live stock on the farm, as now (October, 1858) settled for the winter, consists of —

13 Cows (crosses).
1 Short-horn bull.
12 Two-year-old cattle for feeding.
13 One-year-old cattle for feeding.
12 Calves of this year.
90 Ewes, and 2 Leicester tups for early lambs to sell off.
20 Half-bred lambs to fill up stock.
1 Boar and 3 breeding sows, with their last and present litters.

About eight acres of turnip will be let for sheep-feeding. This is not a paying practice, — giving usually less than £6 per acre ; but it sweetens and improves the ground when practised once in each second rotation, —*i.e.* in each ten or twelve years.

The labor is performed by the following permanent servants, viz : —

Two working grieves.
Five ploughmen.
Three lads for cattle and sheep.

Extra male laborers are employed as required about ditches, dungheaps, and composts. Women workers do the green crop and barn work under the grieve's supervision, and also the principal part of the harvest work, which is all done by the sickle, except the oats, which are cut by the scythe.

The men have cottages, each of at least two rooms, on the farms. They are on yearly engagements, and, calculating the provisions they receive at wholesale prices, they receive, including their money wages, but exclusive of rent on their houses, £28 per each ploughman ; the grieves, of course, receive considerably more. The boys are fed in the kitchen.

Five pairs of horses are employed, five mares, and five geldings. These perform all the tillage of the farm, and also the delivery of the grain and potatoes grown, the larger portion of which, — say, at least two thirds, — are delivered at a distance of 11 miles from the steading, being the nearest seaport and railway station. A horse for riding and driving is, of course, kept as a part of the business equipment of the farm. I have been unfortunate in rearing young horses, and I believe chiefly from the cause that the studhorses travelling in the district are overtasked with mares. It will be observed that a considerable sum (£98 15s. which is after deduction of old horses sold off) is charged for horses purchased ; and but one young horse is rearing up on the farm.

I have thus given, in accordance with the requirements of the Society, a full description of the farm, and described the system on which it has been managed and cultivated, the improvements effected, stated the expenditure and returns, and explained the mode of accounting.

I am further instructed by the Society's Premium List "to consider how much extra or imported manure is required to maintain in high condition a farm of 300 acres, cultivated on a four-course shift, when potatoes forming one half of the green crops, and the grass, made into hay, are both sold off the farm."

Before giving a reply to the question thus put, I would observe that the course of cropping pointed out, — namely, a four-course shift, — is by no means the best that could be adopted for the development of high or even good farming. It gives but one cleaning in four years to the land, one manuring also. It likewise brings the grass crops into such close proximity to each other that the red clover, the successful growth of which is, if not indispensable, at any rate highly conducive to the fruitfulness of the soil during the rotation, has but small chance of succeeding. Moreover, the two cereals, wheat and oats, will not, manure and cultivate as we may, give their full produce when revolving in such a close and narrow round. The course of cropping pointed out would appear as if intended to meet the case of close proximity to a town or city, where town manure can readily be obtained by purchase, and a high price got for early potatoes and for cutting grass and hay ; but I believe that this is precisely the situation in which the cultivation of green crops should preponderate. They are in such a situation considerably more money-producing than grain crops ; and though these are also necessary, I conceive

that in such districts *corn crops should be grown to facilitate the growth of green ones;* as in more distant districts green crops are grown preparatory to grain ones.

The rotation I would consider most appropriate for such a situation is a five-course shift of this nature: —

1. Turnips, swedes, and yellows, and mangold.
2. Potatoes.
3. Wheat.
4. Clover grass.
5. Oats.

Or, viewing the facilities in such a district, for a disposal of dairy produce and of early lambs, I would be inclined to make it into a six-course shift by continuing the grass as a pasturing crop for a second year, in which case there would be sown, along with Italian rye-grass and red and alsike clovers for the first year's cutting, a mixture of seeds for second year's pasturing. The only objection is the distance of time between the cleaning crops, which, leaving an interval of three unfallowed years, might tend to make the land foul; but as the two green crops follow in succession, an opportunity is afforded of thoroughly destroying every root-weed; and if surface or annual weeds are feared, they can be kept down by drilling the corn and hoeing it either by hand or machine. I think that even an improvement would be made on this course by taking barley after the wheat, preparatory to laying down with grass. It would then stand a seven-course shift; thus —

1. Turnips and mangold.
2. Potatoes.
3. Wheat.
4. Barley.
5. Clover grass for cutting.
6. Pasture.
7. Oats.

Following out, however, the instructions before me, I take the case of a farm of 300 acres on a four-course shift; say —

75 acres grass cut for hay.
75 " oats.
38 " potatoes.
37 " turnips, mangolds, cabbage, and carrots.
75 " wheat.

I would apply to the grass, in March, 2 cwt. Peruvian guano per acre; and in April or early May, when showers are falling, 1 cwt. nitrate of soda. An early and a heavy cut of grass for home consumption by horses and soiling cattle, and for making into hay, would thus be obtained. Thus treated, I would calculate on a good aftermath, to be either sold or used in the yards followed by a rich sward for sheep, up to Christmas. It would then plough down for oats, with the prospect of a heavy crop, without any further addition of manure.

I would manure the potato and turnip breaks well, so as to have a full produce from them, and the land ready, without further manuring, for the autumn wheat crop; storing the turnips, &c. early in November. I believe that if a moderate portion of oilcake or other feeding-stuffs is used along with the turnip and mangold, &c. produced in feeding cattle, the oat straw may be consumed, and the wheat straw

trodden into manure; that thus sufficient "muck" (the farmer's surest friend after all) will have been produced at home to give twenty loads per acre to all the green crop break.

I would give the potatoes at planting 2 cwt. superphosphate, and 1 cwt. Peruvian guano per acre, and top dress them with 2 cwt. Peruvian guano at the first hand-hoeing. This practice I have found by experiment to give the largest produce. To the turnips, &c., I would give 2 cwt. superphosphate and 3 cwt. Peruvian guano per acre at sowing, adding to the mangold 5 cwt. of common salt.

Thus treated — of course presuming careful culture in other respects — I have no doubt that even under a four-course shift, "the land would be maintained in a high condition," though I question, for the reasons already explained, whether the produce would be so high of any crop as it would be under a more extended rotation.

We would, adopting the practice thus suggested, have a total use of purchased manure to the extent of

375 cwt.	Peruvian guano, at 12s.	£225 0 0
75 "	nitrate of soda, at 18s.	67 10 0
150 "	superphosphate, at 7s.	52 10 0
30 "	salt (6 acres mangold), at 1s.	1 10 0
		£346 10 0

Or a little more than 23s. per acre. This, though it may appear high, would, under the circumstances suggested, be, I believe, a wise, safe, and profitable rate of expenditure.

Agricultural Miscellany.

It was originally intended that this number should complete the first volume of the New Series of the Transactions, and it was a part of the plan that a portion of its pages should be devoted to an abstract of the contents of the original volumes, which date back almost to the commencement of the century. This design has been postponed, but not abandoned; and the delay, we hope, will be the means of securing a better execution of the work than would have been possible if it had been confined to the limited pages of the present number. In the mean time, we shall avail ourselves of the facts and opinions which we find recorded in the earlier pages, in speaking of the progress which agriculture has made in Massachusetts within the present century.

Indeed, it is only to the old Transactions of the Society

that we can refer to for this purpose. The very first pages of its earliest volume contain a series of questions, addressed to farmers, which cover the whole ground of agricultural practice. Many replies to these questions were received, and are to be found in the subsequent volumes of the Transactions. Some were prepared with care by gentlemen distinguished for their practical information and general intelligence, and others by associations of farmers, who in this manner brought their individual knowledge and practice into a common stock. The materials thus collected are of very great value in elucidating the subject now before us, and by their aid we can gain a pretty correct knowledge as to our agricultural progress.

In taking for our starting-point the existence of this Society, we meet with one important fact at the outset, which is, that the average size of farms has not varied materially for the last fifty years. The returns made to the Society in 1807, from various parts of the State, agree with the census returns of 1860, in fixing the average at about one hundred acres. Whatever progress, therefore, that we have made or whatever may have been our decline, it cannot be ascribed to a change in the size of our farms; it is needless, perhaps, to add that their tenure also continues the same; farmers now own, as they have always done, the land which they cultivate, constituting still a large and influential class in the body politic.

We know no more satisfactory method of measuring our actual progress in agriculture than by comparing the amount of the principal products per acre of the two periods, half a century ago and at the present time, and also the value of land, as nearly as it can be ascertained, at the same periods. If, upon this comparison, we find an increased agricultural production and an enhanced value in our farming land, we may safely conclude that we have made a decided progress; if we could show that every acre produced thirty-three per cent. more in food than it did fifty years ago, while the value of the land has increased, during the period which has elapsed,

twenty-eight per cent., as is stated to be the case in England,* we should unhesitatingly assert these facts as conclusive evidence of increased agricultural prosperity. Passing by the system of cultivation, which has varied in no important particulars in Massachusetts, except in the use of better implements, and taking the leading crops of 1807 to 1810, and comparing them with those of 1855, the following are the results.

Average	Indian corn	per acre,	in 1807,	was	31	bushels.	In 1855,	was	28½ bushels.
"	Wheat	"	"	"	19	"	"	"	15 10-13 "
"	Rye	"	"	"	16½	"	"	"	12 6-14 "
"	Barley	"	"	"	22 3-5	"	"	"	20 "
"	Oats	"	"	"	26½	"	"	"	21⅓ "
"	English hay	"	"	"	2,381 lbs.		"	"	1,953 lbs.

Throughout the list a marked decrease in production per acre is exhibited, but in the growth of animal food, the falling off in quantity is still more striking. In 1807, the amount of neat stock to a farm of one hundred acres was about fourteen head; it is now but seven, and sheep, which averaged twelve to a farm, now hardly come up to four. In horses, also, kept for farm work, the number has lessened, though there has been a considerable increase of those kept for other purposes.

The result of this examination, thus far, is not very encouraging, and do not afford any evidence of agricultural progress; on the contrary, it would seem as if we had been retrograding. Massachusetts, striped all over with railroads, dense in population, with twenty consumers of agricultural products to one producer, richer in the ability to purchase food than any other people in the world, shows but one beast to every seventeen acres, and one sheep to every forty acres. While England, under similar circumstances as to population, but far inferior to Massachusetts in its general ability to purchase food, raises one beast to every thirteen acres, and one sheep to every five and a half acres, to say nothing of the great superiority of the stock raised in weight and quality. Notwithstanding our great inferiority, however, compared with English agriculture at the present time, and

* The Farmers' Magazine. London, Jan. 1861. p. 51.

compared with our own fifty years ago, the Transactions of the Society during the intermediate period show a condition of things which give us some encouragement for the future.

After the institution of this Society, and as soon as its labors had commenced, there was a very marked improvement in every department of agricultural industry. This continued until after the war of 1812. Then it was that emigration to the West began upon an extensive scale, robbing us of our most enterprising farmers, and carrying with them the intelligence, skill, and capital which was needed at home. From that time to this, the exodus has been constant. The ill effects of it, however, have not kept pace with the original cause. Since the war, we have become a manufacturing people, and the growth of our industrial population, not engaged in agriculture, has been prodigious; the demand for such agricultural products as from their perishable nature or from the cost of transportation, could not well be brought from a distance, has consequently given a fresh impetus to home agriculture. We think, from all that we can gather, that the greatest point of depression was reached as early as 1820, and that little change took place for the ten or twelve following years. Since that time, however, an improvement, accompanied by an increased attention to the subject, is distinctly visible. Horticulture led the way, and it is perhaps to the success which has attended the labors of those who have been engaged in it, and from the skill which has been developed in its several departments, that we are indebted for much of the progress which agriculture has made during the last twenty years.

The success of the horticulturist is readily explained by the creation of a large home market for our manufacturing population, and the reason why unsuccess attended so long all agricultural efforts. The great increase of our non-producing population by the introduction of manufactures created large towns which required a daily supply of fruits and vegetables, that could only be grown in the vicinity where they were required for consumption. The enterprise of the man-

ufacturer stimulated the energies of the neighboring cultivator to meet the demand. Those, too, who were engaged in the mill, or the machine-shop, and more particularly those who overlooked their operations, possessing perhaps more intelligence and more leisure, commenced a higher system of culture in their own gardens, and thus became examples which were not lost upon the neighboring farmers, who turned to garden, rather than to field culture, for a remunerative business. The farmer more remote from the town did not feel the benefit of this new demand for food, and of the examples which had been set for its profitable production. He plodded on in the old way, competing all the while against the great, growing, and fertile West in raising, as his fathers had done, crops which could be grown more abundantly and cheaper elsewhere. While, therefore, a home market had been established which gave life and vigor to one class, the other was struggling for existence against a competition that the former had not to contend with. Notwithstanding, however, the introduction of railroads, which has made transportation cheaper every year, we think that the increasing intelligence of the Massachusetts farmer, a better knowledge as to the method of manuring his land with a view to increased production and a greater economy in labor, has about balanced the advantage which the Western farmer at one time had over him, taking into account another fact, that while the Western States are generally being scourged by a fatal system of cropping, producing greatly less per acre, we are now slowly but certainly increasing our production, and improving the fertility of our soil.

There are cheering indications of a more rapid improvement in the next five years than we have made within the last twenty, — some of which we shall point out hereafter, — all of them founded upon the only sure basis, — an increasing profit derivable from a higher and better system of cultivation. We place no reliance for our future progress upon any cause except that of *success* in the business of agriculture. We do not think any one a benefactor to mankind simply

because he makes two blades of grass grow where one grew before; he must also produce them at a less proportional cost; nor have we the least desire to see any one embark in the business of agriculture on account of any supposed dignity that may be supposed to lie in the pursuit. The only question we care to see discussed is, whether it will pay a good round profit. Any honest pursuit that will do this possesses the elements of dignity and usefulness; and if it will not, it had better be let alone. If money cannot be made by farmers in Massachusetts, they ought to know it; if it can be made a profitable business, it is equally important for them to know it. For, the more profitable the business can be made to be, the more dignified it is, and the more advantageous to the Commonwealth.

We have then to consider what the impediments are to success, and how far they are capable of being removed, for it sometimes happens that the very obstacles which oppose us may be turned into advantages. Competition in business is generally supposed to create additional skill, so much so that it is often called *the life of trade.* If the virgin soils of the West yield more abundantly than our own, and if cheap transportation has almost brought us upon an equality in our home markets, for such products of the soil as we have been accustomed to raise, we are not to give up the contest without seeing what more skill and more capital can do, nor without seeking to find something we can raise at a profit, which is not affected by these conditions. We ought to take heart from our English friends, who, when the corn-laws were repealed, which gave them ample protection against cheap food from abroad, went to work with an energy worthy of all praise. The result of it was that they succeeded in making wheat at fifty-seven shillings per quarter pay as much profit as seventy shillings per quarter did before. Better farming and greater skill and economy accomplished this wonderful result. Instead of the short-sighted course which was taken in Massachusetts, under similar circumstances, by which our soil became shamefully deteriorated, the English farmer

increased his outlays in draining, manuring, and in labor-saving implements, to an extent that would hardly be credited by the farmers of New England.

It cannot be said that in Massachusetts the high price of land is an obstacle in the way of a farmer's success. Farms of good natural capabilities, well fenced, and, in many cases, with house, barns, and every reasonable convenience, can be bought for less than the improvements; that is to say, the land can be had for about nothing. Nor do the taxes levied upon lands used for the purposes of agriculture amount to a sum worth consideration. We have, therefore, really nothing to contend against, unless it be from *better* not *cheaper* lands in the West, to which we ought to oppose higher skill and more capital. Indeed, we have heard it said that the one great impediment to a greater progress arises from the fact that our farmers get a living so easily that there is no inducement to greater exertion, and it has been gravely maintained that we should be in a more prosperous condition, if, like the English and Scotch farmers, we not only had heavy taxes, but a high rent to pay. The imposition of a heavy tax per acre would certainly teach us to consider well the use of the land, and of its value in that important view, — profit, before we ventured to become one of Ralph Waldo Emerson's "Nature's noblemen," on a very large scale.

We are inclined to the opinion that the chief obstacle which stands in the way of a Massachusetts farmer's success lies in himself. A farmer has no right to expect to make himself rich, who does not bring to his farm a proper amount of capital and skill. This is the condition which is attached to all other industrial pursuits, and there seems to be no reason why the agriculturist should be exempted from it. As in all other business, perhaps in a higher degree than in most, the farmer should thoroughly understand the work before him. He must arrange his system of culture and of his crops according to the nature of his soil, and the situation of his farm as to markets, and he must know the cost of everything he raises, and the extent to which capital, in the form of labor,

manure, and other amelioratives, can be most profitably applied. We have heard it said that such knowledge is out of the question in farm management, — that farmers can not calculate upon the weather, and a thousand contingencies which do not affect other operations. To this it must be replied that there are as great contingencies affecting the course of all trades, and no one however wise and prudent can always command success. He, however, who calculates the chances most closely, and who guards against them with the greatest skill, is pretty sure of eventual success, no matter what the business is that he undertakes. That the farmer can calculate as well as other men is illustrated by the tenant farmers of England, where as few failures occur as in any other pursuit. The English farmer hires his farm, and carries upon it a large amount of capital, and pays a high rent; a bad calculation would be ruinous to him in a very short time. His rent presupposes a certain profit to be made, and the necessity of the case forces him to learn the capacity of the land to produce that profit before he enters upon it.

That there is some profit in agriculture, even as it is practised in Massachusetts, cannot be denied; for, unless it be so, no one would follow the business; that it is less than in many other departments of industry may be inferred, since so many are willing to relinquish it altogether, or to seek more inviting fields for its prosecution. Probably every one of our readers know of cases where farming has been and is now profitable, the farmer acquiring a handsome competence, if not great wealth, from the cultivation of the soil. Such instances, however rare they may be, serve to prove the capacity of the land to produce a profit; the more numerous they are, however, the stronger argument they afford of the profitableness of the pursuit, while the same rule does not apply to failures and want of success to prove the converse of the proposition. If a dozen men are engaged in a similar manufacturing or commercial pursuit, and nine out of the twelve fail in it, while the other three succeed, the success of the latter establishes the fact that the business is

capable of being made a profitable one, and the failure of the nine only shows that they did not understand the business. So with agriculture; if two or three farmers in a neighborhood make their business profitable, while all the rest just rub and go, or fail utterly, the same general truth is established that farming can be made profitable, and that when it is not so that the fault lies with the farmer and not in the land. We are not then to decide upon the profitableness of farming in Massachusetts by looking up cases of failures, unless it may be for the purpose of investigating their causes, with a view to seeing how they can be avoided, and this can be done far better in another way. If we can find instances of successful and profitable cultivation, and we can ascertain the method or system by which these results were obtained, we can very reasonably conclude that the cases of failure grew out of a want of that method or system, or from its misapplication. A clay farm treated in the same way as a gravelly one, would probably prove a failure, and so *vice versa*, and it is, perhaps, to our want of that practical education, which teaches us how to discriminate and to adapt our operations to the soil we cultivate, that a large portion of our failures occur. A farmer is half his life learning in this respect, what he should have known at the start. To return to the capacity of land in Massachusetts for profitable cultivation.

The Transactions of the agricultural societies furnish annual statements of premium crops, and some of them do, and all should give a careful and minute account of the nature of the soil on which the crops are grown, the amount of manure applied, and the various operations connected with its cultivation together with the amount produced. This is done, as we all know, in the form of an account, showing the profit and loss of the crop. These statements may not be strictly accurate in all respects, but when it is remembered that they are usually made by our most intelligent farmers, and that they are subjected to the scrutiny of other intelligent farmers, who award the premiums, it must be presumed that they are not very far out of the way. We have taken from such of the Transac-

tions as are at hand, covering nearly the entire Commonwealth, those which have the greatest appearance of care and accuracy, and not those, in all cases, which have shown the greatest profits, and we have discarded all where the product and the profit per acre were not made up by competitors themselves and subject to the scrutiny of a committee making the award. The following table is the result.

Kind of Crop entered for Premium.	No. of entries.	Average product per acre.	Average profit per acre.
Wheat	7	37 bush.	$46
Oats	7	63 "	28
Barley	5	36 "	23
Rye	7	35 "	31
Corn	7	88 "	51
Carrots	7	875 "	159
Potatoes	7	238 "	81
Onions	7	691 "	310
Turnips	8	588 "	100
Mangold	2	889 "	117

By the above statement, it appears that the five principal cereals can be grown in Massachusetts at an average profit of $35.80 per acre, and the five principal root-crops at $153.40 per acre. These figures, incredible as they may appear, are not *cooked* for the occasion, though, of course, we cannot vouch for the correctness of the returns from which they were made up. We can only say that they appear to be as reliable as any that we are accustomed to regard as conclusive in similar cases. If they approach within half way to the truth, they certainly establish the fact that the capacity for profit does exist in some farming lands in Massachusetts, and that there are farmers who know how to avail themselves of it. It must be borne in mind that these are the statements of our best farmers, and these crops could only be produced, as we all know, by heavy manuring and careful cultivation; therefore, we say, important facts are established by them, viz: that high farming in Massachusetts will pay as well, nay, ten times better than high farming in England or Scotland, where it is the rule, and not as with us, the exception;—that, if raising fifteen bushels of wheat or thirty bushels of corn to

the acre will not pay, we must increase the production;—that the capacity of increase in the soil, if skilfully managed, exists to a degree that will command a very large profit.

We commenced agriculture, as in all new countries, with a system the very opposite to that which ought now to be pursued. The natural fertility of the soil has been exhausted by low farming and by unscientific cultivation, and we have long ago reached the point where, to make the land remunerative, we must do something more than dig, plough, and plant. We must apply more capital and more skill, if we wish to succeed as farmers. Capital never fails to lend its aid whenever and wherever an opportunity is presented for its profitable employment, and skilful husbandry offers a more tempting field to intelligent enterprise than many other branches of industry; the difficulty consists in finding it, and not in giving it employment. Even in our trading community, most men cling to the idea of a farm of one's own with a strong tenacity, and if the possession of one could be made to satisfy cupidity, as well as the natural pride attached to the ownership of land, capital would readily flow into the channels of agriculture, which have been slowly drying up from a want of skill in its application.

Many pages of this volume are already occupied with remarks upon the necessity of higher agricultural education, yet we do not like to leave this subject without one more appeal upon this point; for we firmly believe that agriculture can be made a profitable pursuit in one way only. We must have men who have been thoroughly educated and trained to the business. Our much-vaunted system of education, however, tends to drive our children from the farm and to send them to more exciting occupations. The heads of our young men are cultivated at the expense of their hands. We manufacture a crowd of future politicians and free-thinkers, who take to a trade or occupation in some large city or manufacturing town, which, with its lyceum lectures and debating societies, acts as an entering wedge to a further development of their training at school. The quiet and regular labor of

the farm is irksome to one who has been taught a little of everything except what is needful to the young farmer. Ploughing is dull work to the boy whose exploits at school have been crowned by declaiming extracts from the speeches of Pitt, Fox, and Burke, — of Patrick Henry, Clay, and Webster. We rear a multitude of lions, which life, with all its vicissitudes and trials, is not long enough to tame and make useful in carrying forward the real purposes of our existence.

One cause of this, and we think it the chief one, is the difficulty of finding teachers in practical agriculture, and in the labor, both mental and bodily, which is required to make a farmer much more than "a hewer of wood and drawer of water." We can find an army of men who can teach the abstrusest of sciences from well-prepared text-books, but when the book of nature is opened, and the practical processes are to be unfolded through which its operations are converted into abundant food for man by the aid of science and the exercise of skill, the teacher for all this is not easy to be found. Science and practice are two very different things; and in agriculture, as practised in this State, where landlord, tenant, and laborer are united in the same person, they must both be mastered in order to constitute a perfect farmer. Now who is there to teach, where so much is to be learned? We have amongst us a fair amount of agricultural science, and there are farmers who excel in correct practice, but they are few and far apart, and their example is therefore limited in its effects. Primary schools and schools of practice would do something towards a higher development, and in time systems of instruction might be introduced which would change for the better our entire farm husbandry. "The Farmer and the Farm,"* we hope, will pardon us for abridging his excellent article on the requirements which are necessary in order to be a successful farmer in England, selecting so much of it as applies to the farmer in Massachusetts.

Judging from these requirements, we shall find that the education of a farmer is not to be obtained at our common

* In the Farmer's Magazine. London, July, 1861.

schools, followed up by a year or two of practice in the common routine of the farm, in Massachusetts.

He says: "Take the farmer of one of the more general of our larger farms, *i.e.* a mixture of arable and pasture land of various tenacity and quality. How is each to be managed to the best advantage? And be it known that in these modern days it is only this best management that will repay the farmer, while it also adds wealth to the nation; a twofold benefit of no ordinary importance, and well worth every intelligent farmer's consideration.

"Take him in the general arrangement of his business, as a planner, designer, or contriver. In this department he has to exercise much forethought and discretion. The arrangement of his business must be well contrived, and clear and distinct throughout, comprising in one view the past, the present, and the future. The management of the past month will require his present careful attention, and it will require it through the future. This he must provide for, and he must plan and lay out his work accordingly, or his business operations will soon all be crowded and in confusion.

"Take him in the management of his crops. What are farm crops? They chiefly consist of the corn or grain crops, and of the roots or esculent crops; and farther, of herbage and seed crops. Now, the farmer has to make himself acquainted with the nature and culture of most or all these separate crops before he can sow them. He must ascertain the precise kind best adapted for the soil he cultivates; and the varieties in these crops, and of great value are very many. Take wheat, for instance: I have seen above eight hundred different specimens or varieties of wheat, each possessing a separate distinction and name. Barley, too, is to be found in almost endless variety; and, indeed, the same holds good in all other grain, root, or herbage crops, and, for the most part, each is best adapted to some peculiarity of soil or climate, which the farmer, however homely he may be, has to make out. Then, take him as to the management of any single crop: He must be acquainted with the precise nature or habit of the plant producing the crop. It is not barely ploughing and pulverizing, and putting in the seed. Wheat, for instance, in this country, for the most part, is an autumn-sown grain; but if he chooses a proper variety, he may be almost independent of the season. Take the last wheat-sowing season: never was there a more difficult time to get in the wheat-seed, and many are the "bad plants" this year; but a man well acquainted with his business would decide at once as to the policy of putting in a wheat crop improperly, and would of course wait a more suitable season, and select his variety accordingly. One of the best crops of wheat ever known in the neighborhood from which this paper emanates was sown in the month of May, and one of the best crops the writer saw last autumn was sown late in the spring. It was the horned spring wheat in both cases. But I need not enumerate these things to my agricultural readers: they know them well, and that the same character of remark or observation would apply to every crop he grows. He is compelled to acquaint himself with all these matters, or he must fail in applying them in the conduct of his business.

"The cultivation of seed crops is more difficult still. Take the turnip seed crop for instance: He has to select his bulbs, to plant them in a properly prepared soil adapted to his purpose. There is the mode of planting, the time for planting, the size of the plants or bulbs, the distance requisite from plant to plant; then the subsequent hoeings by horse and manual labor; then the constant "roguing of the

crops," *i. e.* taking out when in flower every stray kind or "bastard," and known by the color of its flower; then comes the harvesting, thrashing, dressing, and preparing the seed for sale, all operations requiring not only judgment, but great experience. Now, this is the same general course required throughout, in the management of all seed crops.

"Take the root crop again, potatoes, for instance. Here is again an almost endless variety to select from. Then comes the preparation as well as selection of the field for the crop, knowing that it must be one in high condition, or else requiring a great outlay in artificial manure, which he has also to select. Then there is the preparation of the sets, their size and mode of cutting, the manuring of the land, and the mode in which it is to be applied, *i. e.* "in ridges or on the flat;" how the artificial aids are to be sown. Then the distance in the rows, the space from set to set, the depth to be planted, the covering up; then the subsequent culture, the oft-repeated horse-hoeing and hand-hoeing, and mouldings up, &c., &c.; then the care requisite to prevent the least injury from disease, *i. e.* taking off the tops on its appearance, or the remoulding up as soon as the top decays, or the taking up and graving the crop; then the preparation for safe-keeping, the mode of graving, the size and width of the grave, and the manner of covering all up; then at last comes the preparation for sale, the riddling, size of mesh, the sorting into the ware, the chats, and the refuse. All these matters, and more, the farmer is compelled to learn ere he cultivates potatoes.

"Take again the culture of forage plants: the farmer has to acquire a good if not correct knowledge of their varieties and habits of growth. He does not sow sainfoin on sandy or silty loams: he chooses chalk soils and the like on which to sow. Trefoils he would put on gravels or sandy soils; Dutch clover on any thin soils; chicory on good deep loams of any kind; lucerne on deep loams, clayey gravels, or chalky loams. Then he has to acquire the knowledge requisite to their profitable management. Take lucerne, for instance: it does not come to full perfection till the third year, — a long time to wait, — consequently he will sow it in rows near together; and, as it grows and strengthens, he will take up every alternate row, when the full development will take place; but he will have secured a good cutting from the fact. Then he has to attend to the forking, manuring, and careful cleaning; nor will he, on any account, suffer stock to depasture upon it. Similar in substance are the remarks to be made upon the management of sainfoin and other herbage crops, and grass-seed crops; but these would take up too much of our space. I think sufficient has been said already to show that "the farmer on the farm" must, if he is to prosper, be a man of intelligence, and that in the application of his mind to the management of his business he has to exercise as much plodding thought and careful judgment as any other class of the community. It is this I want clearly to show and to prove, — that he is worthy of a much higher estimate for intellectual attainment or acquirements than has hitherto been accorded to him.

"Take him as a breeder of stock. It may appear to the uninitiated a very simple course to breed animals for the supply of the farm on which they are to be reared for sale or fatted for the market; but put him to the task, and he will soon discover his error. *The breeding of cattle, for instance:* Animals bred from a good stock are of quick expansive growth, will thrive and fatten rapidly, and are very early brought to maturity; while to breed from a herd of common ordinary unimproved stock,

they will grow slowly, they will never fatten, but remain on hand for months or even years before arriving at full maturity. And this department of cattle-breeding is carried out with consummate skill and judgment in a very many ways. It has become quite a science. No novice would be able to estimate the product of certain animals being put together for breeding purposes. A breeder of standing, however, would tell you at once what would be the result. Hence the judgment in selecting sires to dams, strain of blood to strain of blood, &c. Then, again, the breeding of cattle for particular localities is attended with vast advantage. The small and beautiful Devon for the hill or mountain pastures, the Welsh and Scotch for cold climates, and mountainous heights, or the larger breeds for the fatting pastures, and the smaller breeds for the inferior pastures, — all is the result of a wise and a thoughtful class of men, who have to make the best produce from their holdings, in whatever district they are placed.

"But we will take the farmer in his grazing department, independent of his breeding arrangement; although we may here allude, in passing, to the rearing of his young stock; for the professional grazier buys in young stock to rear, "to grow" for future service. These he will place on his sweetest and most healthy pastures of somewhat inferior character, and generally they are intermingled with his sheep stock; as they grow and thrive, they become qualified for removal to the better pastures, to which they are removed as openings take place, and are replaced by others equally young, and thus his succession is kept up, — the cattle adapted to the pasture, and *vice versa*.

"The fatting cattle are of course put upon his best pastures, which are duly prepared, by rest and occasional manuring, to receive them. In this case he has to exercise his judgment, and purchase or select his stock according to the quality of his pastures. He will place his large oxen on first-class lands only. On his second-class lands he will place heifers, young draft cows, or animals from some of the smaller breeds of cattle. He knows that if he places first-class oxen on second-class grazing lands the balance must be made up by good artificial feeding. The former is the common order of cattle-grazing, but the latter is now becoming the prevailing custom, *i. e.* to stock somewhat inferior lands with cattle, and supply them with the best fattening food, — generally linseed cake at the rate of from four pounds to seven pounds per day. In addition to the proper "stocking of his land," he has to watch (daily almost) the state of his pastures. "The bullock pasture must be kept right;" consequently he has to add or diminish the number of animals in accordance with the season, *i. e.* the growth or declension of his pasture, his sole aim being to keep his cattle in the highest progressive state; failing which his profits will not be remunerative. The pasture itself he also has minutely to attend to, or it won't be "kept right." The mowing or chopping up the rough-growing grass, the "knocking" of the manure deposits; the shelter, the rubbing posts, the waterings, the fences, — all have to be cared for and provided. Anybody may graze cattle; but to graze them *aright* requires knowledge, tact, and excellent judgment, to say nothing of the experience requisite to detect any falling off in condition, or symptom of disease, as soon as either shows itself, in order at once to prevent danger.

"The grazier of breeding cattle has perhaps a more difficult task still. To graze cattle properly of each kind and age requires a very considerable knowledge of their habits and diseases, and the means of prevention and recovery. "The eye of

the master grazeth the ox." Verily, no novice need expect to prosper as a breeder or grazier of cattle. I again confidently repeat that the British farmer has as great a scope for knowledge, tact, and judgment in the management of *his business* as any other class of the community, in whatever business they may be engaged in."

What we have quoted from the Farmer on the Farm, is a fair epitome of what a skilful farmer should know, showing what the nature and extent of his education ought to be. Is such an education to be had in Massachusetts?

Experiments with Manures — Premium for 1859.

This Society has offered premiums for renewed experiments with manures, commencing with 1860. It has been induced to increase the premiums for the second series, in the hope of collecting a larger competition, believing that if they are carefully made they will serve a very useful purpose. For the premiums of 1860, but 13 entries have been received. As it may be of use, as it is certainly of interest, to know something of the result of the first year's trial, the following table has been prepared, without quoting the names of contestants, to show the effects of the application during the first year. It will be remembered that five lots of land of equal quantity and quality were to be selected; each of the five lots were to receive a deep ploughing, a shallow ploughing, and a harrowing, the only difference being that, on lot No. 1, the manure was to be ploughed in deep, the 2d shallow, 3d buried only slightly, 4th left on the surface, being equal in quantity to each lot, none being applied to lot No. 5.

General Result of first Year's Experiments, 1859, *with Manures as above described.*

Experiment.	Largest yield.	2d do.	3d do.	4th do.	Lowest do.
A lot	1	2	3	4	5
B "	1	3	4	2	5
C "	2	1	3	4	5
D "	2	3	4	1	5
E "	2	3	4	1	5
F "	2	4	1	3	5
G "	3	2	4	5	1
H "	3	2	1	4	5
I "	3	2	1	4	5
K "	3	2	4	1	5
L "	3	2	4	1	5
M "	3	2	4	1	5
N "	4	3	2	1	5

From the above Table, it appears that the plots deeply manured produced the

	Best Crop in 2 experiments			
Second	"	"	1	"
Third	"	"	3	"
Fourth	"	"	6	"
Fifth	"	"	1	"
	MANURED SHALLOW.			
	Best Crop in 4 experiments			
Second	"	"	7	"
Third	"	"	1	"
Fourth	"	"	1	"

	HARROWED IN.			
	Best Crop in 6 experiments			
Second	"	"	4	"
Third	"	"	2	"
Fourth	"	"	1	"
	LEFT ON THE SURFACE.			
	Best Crop in 1 experiment			
Second	"	"	2	"
Third	"	"	7	"
Fourth	"	"	4	"

No manure produced the least in twelve cases, the exceptional one being experiments where it stood fourth, crop having rusted on lot No. 1.

So far as these experiments have gone, they go to show that, for an immediate crop, at least, ploughing the manure under very deep does not produce corresponding return, the best result being very nearly equally divided between that which was ploughed in shallow and that which was only harrowed in. Where the manure was left exposed on the surface a better result was obtained than where it was deeply covered. We have yet to learn the effect of manuring deeply or lightly with a view to succeeding crops, a fact of infinite importance to the farmer. The late Mr. B. V. French once tried the experiment by ploughing in the manure of half a field "as deep as he could get it," and then treating the entire field alike, manuring the whole of it equally, and ploughing it in very slightly. He kept an account of the product for several years, and the yield on each part was alike,—to use his own language, "I never saw anything of the manure which was buried deeply; it was, in my opinion, *thoroughly buried.*"

In these experiments, in order to have a completely satisfactory result, sufficient manure, say not less than ten or twelve cords of barnyard manure, or its equivalent, should be used to the acre; enough, at all events, to have the effects of it felt during the period of the trial. One great mistake in our farming is, to attempt manuring too large a surface. An acre

of land highly manured will produce vastly more for five years, without any further addition, than a fifth of the quantity annually applied for the same period.

We close our sketch of the progress of agriculture in Massachusetts with some notes by Judge French upon the subject of drainage. His remarks upon the legal rights of owners of land upon streams and rivers, are deemed of peculiar interest at this time.

Drainage.

By Henry F. French.

Among the decided advancements in the agriculture of the world in the last half century, stand prominent those caused by the improved processes of drainage. We refer not so much here to the drainage of what are usually termed *wet* lands, such as swamps and marshes, as to the thorough reclamation of lands of a higher grade, not swampy, but yet filled with stagnant or cold spring water, to such an extent as to render them, if not wholly uncultivable, at least precarious, and dependent on favorable seasons for a crop. Of this character is a large proportion even of New England. Almost every farmer has some small field which he regards with favor, because sometimes, when the season is not wet or backward, he harvests from it a fine crop, and yet, which he watches with ceaseless anxiety, because heavy spring rains may prevent his preparing it for the seed, or after it is planted or sown, may drown his springing crop. He wants this field just a little drier, a little earlier, and he will regard it as of more value than any other upon his farm.

A large proportion of the prairie lands of the West are of this description, too wet to allow wheat to be sown in autumn without danger of winter killing, and too wet in spring to allow the proprietor seasonably to sow so large a breadth as he desires.

About one half of all the land in England, Scotland, and Wales is supposed by competent engineers to require drain-

age. Probably fully that proportion in our Western States would eventually be judiciously improved by drainage; while in New England, although a far less proportion of the whole area would be improved by the process, yet perhaps nearly one half of the land worth ploughing, which includes most of the interval and low lands, would pay by its increased product for thorough drainage.

It is found that the rain-fall in New England is far more variable than in old England. While we have more than double the quantity of rain in the year, upon an average, it falls here not only in vastly heavier showers and storms, but in quantities very unequal at the same periods of different years. In April or May of one year, we have not unfrequently twice as much rain as in April or May of another year. This fact renders our farming operations and our crops very uncertain. A thoroughly drained field is free from those vicissitudes; while the soil cannot be over-drained, because it will hold by attraction all the moisture required by the crop; if well drained, no amount of rain ever known will prevent seasonable ploughing, or the maturing of our ordinary crops.

Experience has already shown, that thorough drainage not only prevents injury by surplus water, but also prevents drought. It has this effect in various ways. A drained soil is finer, lighter, and more porous than when undrained, and therefore holds more water by attraction. The same water that may be forced out of a quantity of light loamy soil by severe pressure, may evidently be absorbed and retained again, when that soil is again pulverized, and so rendered light and porous. Again, in a drained soil the roots of the young plant strike deep downwards at the start, if they find no cold water; whereas they spread out on the surface if they reach stagnant water; and when the drought comes they perish in the latter case for want of root, while if deeply rooted at first, they find moisture in the ground sufficient to sustain them.

The capacity of the soil, too, to absorb moisture from the atmosphere is greatly increased by its pulverization, induced by drainage. A well-pulverized soil has more surface of par-

ticles exposed. It differs from a hard compact soil, as a sponge differs from a stone, in its capacity to imbibe moisture.

That droughts affect well-drained lands less than others is attested by all observers both in England and America. The Secretary of the New York Agricultural Society stated, in 1855, the great drought of 1854 being the subject of discussion, that "the experience of the past season has abundantly proved that thorough drainage, upon soils requiring it, has proved a very great relief to the farmer; that the crops upon such lands have been far better, generally, than those upon undrained lands in the same locality; and that in many instances the increased crop has been sufficient to defray the expenses of the improvement in a single year."

While the idea and practice of draining fens and swamps has prevailed for centuries in England, as in Holland and other countries, thorough drainage, technically so called, is, if not a discovery of the last half century, a practice not at all generally introduced in any country before that period. By thorough drainage, we understand such drainage by means of covered conduits of tiles, stones, or other material, as shall at all times, except in the midst of rain-fall, and for a few hours after, keep the water-table or line of standing water in the soil, nearly at the level of the bottom of the drains, and below the necessary range of the roots of the growing crop. Thorough drainage, as distinguished from surface drainage, deals with and removes the water in the soil, whether found there from rain-fall on the field, or by percolation under ground, or in definite springs or currents.

The necessity of such drainage became obvious long before the present efficient systems were devised. Stones, bushes, poles, turf, and various other materials were tried with various success; but no really efficient means were generally adopted in England until tiles were introduced. Tiles seem to have been known and used for some purposes more than a century ago, for we find a statement in a note to Stephens's "Draining and Irrigation," that in a park in Lincolnshire, tiles have been dug up which must have been there more than a hundred years.

Tiles of convenient form, however, could not have been commonly known in England in 1797, for in Johnstone's Report to the Board of Agriculture on Elkington's system of draining, published in England in that year, the only kind of clay conduits described or alluded to by him, are what he calls "draining bricks," a very rude heavy contrivance, as could well be devised. Between forty and fifty years ago, small pipes were in use in various parts of England, but it was not till the year 1843, that tiles or pipes of the present approved forms were introduced into general use. The tile now most approved and recommended, it is believed by every draining engineer of good standing in England, is the simple round pipe with round bore, and the minimum size is one and a half inch bore, two-inch being generally preferred.

Tiles are cheaper than any other conduit, where manufactured within reasonable distance. They are more secure, more effectual, and more durable than any other drain. Stone and other materials will cease to be used, whenever tiles are appreciated and can be obtained at reasonable cost.

To Mr. Parkes, perhaps, more than to any other person, belongs the credit of introducing tiles or clay pipes into common use in England. In this country, tiles were first used in Seneca County, N. Y., by John Johnston, a native of Scotland, about 1855. He brought over patterns from that country, and had tiles of the horseshoe form, made by hand. In 1848, Mr. Delafield, President for many years of the Seneca County Agricultural Society, seeing the success of Mr. Johnston, his neighbor, in draining with tiles, imported a tile machine, probably the first put into operation in the United States. To that county and to the gentlemen named belongs the credit of the first successful experiments in thorough drainage in this country. Tile works have since been established, and many successful experiments in tile-draining have been made, in many of our States, and the supply will doubtless keep pace with the demand.

A word of caution may not be amiss to those who engage in the operations of drainage. It is an expensive process,

and should not be attempted without first counting the cost. Because drainage has usually proved profitable, it is not to be inferred that it will prove so on all lands. Drainage does not add to the elements of fertility in the soil; it only developes those which already exist. Where soil is rich in the elements which nourish plants, and has been prevented only by surplus water from producing large crops, the removal of that water usually leaves the soil for a few years very productive. But it must be remembered that tiles do not manure the soil; but only bring the elements of vegetation into their proper relations to the plant. Heavy crops must soon exhaust those elements, and they must constantly be replenished, or the land will be impoverished. We repeat it: tiles do not manure the soil; and therefore it must not be expected that poor, barren, water-soaked lands will become rich and fertile by merely removing the surplus water; nor is drainage to be set down as a humbug, because such lands, when deprived of surplus water, may suffer from drought. An open, coarse sand is more hopeless than any other soil. It is nearly worthless, whether wet or dry. Clays of almost any kind are fertile if well drained, and it is upon clays that the greatest triumphs of draining art have been obtained in England. By the frequent percolation of water from the surface downward to the level of the drains, the character of the stiffest clay is modified, so that it becomes porous and easily permeable to water, and so, not only is readily relieved of surplus moisture, but is also easily pulverized by tillage operations, and rendered light to work, and very productive under liberal treatment.

As to the drainage of *wet meadows*, although many failures have been noted in experiments upon them, we believe the failure will, in nearly every instance, upon investigation, prove to have resulted from insufficient drainage. The old idea that it was enough to get the water below the surface, by shallow open ditches, is utterly exploded. By that sort of treatment, a crop of herds grass for one or two years may be procured, but the wild grasses will soon take its place, and the meadow relapse into its former condition. There is occa-

sionally to be found a swamp, filled with light peaty soil, which requires something more than mere draining and working to bring it into a productive state. The soil lacks compactness, and may require an addition of clay, or gravel, or sand. In almost every case, however, swamps and low meadows are the receptacles of the vegetable deposits of the surrounding hills, brought in the form of leaves by the wind, and washed from higher fields for generations, and are teeming with the elements of fertility, needing only to be thoroughly drained to be at once productive. We have great doubt whether any instance can be found in the Commonwealth, of a swamp drained thoroughly three feet deep, which has failed, under proper treatment, to pay better than the neighboring upland. Imperfect drainage—stagnant water at the root—is the secret of nine tenths of the failures in the drainage of swamps.

Dykes and Drains.

Starting from Cape Cod, and following the eastern shore of Massachusetts until it reaches the boundary line separating it from New Hampshire, there are upwards of thirty-eight thousand acres of land overflowed by the waters of the ocean at some periods of the tide. They now yield about thirty-four thousand tons of inferior grass, which pays but little more than the expense of making into hay. These lands, could they be systematically drained by means of dykes, with traps to let off the water at low tide, would be the richest, the most fertile, and the most easily cultivated in the State, not excepting the alluvial soils on the banks of the Connecticut. Why this work has not yet been undertaken on a large scale, it is difficult to understand; because in a great many cases, to say the least, nature has so far prepared the work to our hands, that the cost would be trifling.

That experiments in reclaiming from the sea such lands as these, must prove successful and remunerative, we find abundant proof in Europe. The great level of the Fens in Lin-

colnshire, and in the adjoining counties in England, is estimated to contain 1,060 square miles, or 680,000 acres, below the high tides. The greater part of this immense tract is already under the highest cultivation. The general plan of reclaiming it has been, first, to embank the rivers and streams, from the points where they leave the high land and formerly emptied themselves into the Fens, and thus carry them across the marshes between embankments to the ocean. In this way they are prevented from forming bars at the land side of the Fens, and from spreading their waters over them; and they retain, by being thus confined, power enough to keep open a clear channel to the sea. Embankments along the sea-shore are maintained; the Fens are divided by other embankments into convenient tracts, and powerful steam engines, located at suitable points, pump up the water, collected by a regular system of drainage, into the embanked rivers, which pass many feet above the level of the land. These Fens are not unlike the salt marshes of our own coast. They are usually covered with a deposit of dark vegetable matter of various depth. A large proportion of them have a clayey subsoil, which is sometimes brought to the surface by trenching, and mixed with the soil. No lands in the kingdom excel the Fens in fertility. The heaviest crops of wheat grown in England, amounting frequently to from fifty to sixty bushels per acre, are taken from those lands. Immense quantities of the mangold wurtzel are raised upon the Fens, and sold to the upland farmers. The work of reclaiming these lands is still going on all along the eastern coast of England, the experience of generations having established the profitableness of the operation.

Beside the Fens there are large tracts of lands on the eastern coast of England, over which the ordinary high tides formerly flowed, of a different character, being found of a light colored salty deposit, partaking more of the nature of alluvial than of peaty substance. Extensive experiments have already demonstrated that these lands, by embanking, and by the use of flood-gates, assisted by pumps, may be profitably converted into wheat fields.

Indeed, so far as we are able to ascertain, there are no lands overflowed naturally by the tide waters which may not be brought into productive use. In many cases, on our own coast, the marshes are so situated between headlands, that short embankments from one to the other would exclude the sea from large tracts. Experiments of this nature upon a small scale in various parts of this country have, so far as we can learn, resulted successfully, wherever they have been perseveringly pursued. In some cases, after a few years of encouraging crops, the sea has made breaches in the banks, which had been of insufficient height or strength, and the experiments have been abandoned. Such results are however attributable, of course, rather to the want of proper skill in the proprietor than to any inherent difficulty in the operation. It is hoped that those valuable lands, situated as they are in the midst of the most thickly settled portions of the country, and in the neighborhood of the best markets, will not be longer neglected.

Riparian Rights.

Many questions of law have already arisen, and more are likely to arise, as to the rights of land owners to drain their lands. A few years ago we regarded only the surface of the soil, having most of us the impression, though not founded on any process of reasoning, that if the surface were free of water, it was of little importance what was the condition of the soil below. But as we have considered the operations of nature more carefully, and ascertained that the roots of most cultivated crops strike at least two or three feet into the earth, and many much deeper, and have established the proposition that four feet of drained soil is the least depth that we should be satisfied with for the best cultivation, we have begun to inquire by what legal means we may be protected or obstructed in the essential matter of drainage.

The rain-fall of New England in general is sufficient to cover the surface of land to the depth of about forty-two inches

each year. Of this, not far from one half runs off upon the surface or through the ground, coming out in springs, and finds its way in streams and rivers to the ocean, while the other half is taken up by evaporation again into the atmosphere. This is emphatically a well-watered country; through all our valleys, small and great, flow pure streams and rivers. Upon these streams and rivers everywhere are mills and factories, whose wheels revolve unceasing, developing the treasures of the forest into lumber, changing the corn and wheat into meal and flour, spinning and weaving the products of our home-bred flocks and of Southern plantations into useful and beautiful fabrics. To turn those wheels the power of water is required, and water has no power, except as it is obstructed by dams and raised into ponds. The natural streams, thus checked in their flow and thrown back upon the land, not only overflow its surface, but percolate through the subsoil of large tracts not thus overflowed, and prevent wholly or in part the natural and artificial drainage of the soil.

The rights of mill owners and of land owners, both of them of public as well as of private interest, and both equally to be protected by the laws, are thus brought into sharp conflict. The question becomes every day more interesting, more vital to the interests of agriculture and of manufactures, as to the limits of their respective rights.

Has the mill owner the right to overflow the land of the farmer? Has he the right to retard the natural flow of the streams so as to throw back water *into*, though not upon the land? Has he the right to raise the natural stream so as to prevent the natural drainage of the soil, or such artificial drainage as is necessary to its fullest productiveness?

It is the boast of the common law of England, which is the basis of the law of all our northern and eastern States, that its principles are adapted to all the vicissitudes of progressive civilization; that the same principles which adjusted the rights under feudal tenures may be extended to the adjustment of rights involved in the construction and use of modern

railroads and telegraphs. The common law is not a system of rigid rules, nor an inflexible code for specified cases, but it is a body of principles founded upon natural justice and reason.

In many States common-law rights have been modified by statutes, and this is the case in Massachusetts, with rights which pertain to flowage and drainage. The absolute right of the land owner to his soil has been infringed upon by acts for the encouragement of manufactures, and power has been granted, by the statutes known as Mill Acts, and Flowage Acts, to those who desire to raise water powers, to obstruct the natural flow of the streams for the purpose of creating millponds, with which to drive their machinery.

A glance at the ancient landmarks of the common law may be useful, in our endeavor to adjust the various questions which arise, both in this commonwealth and elsewhere, respecting these rights of drainage and flowage. In England, the right of the land owner has always been held almost sacred. It has been said that "all true nobility rests upon the possession of land." The land owner is a freeholder, a landlord,—lord of the soil. His title is the highest known to the law; his house is his castle, and may not be infringed upon, even by officers of the law, except for the service of criminal process. The land owner's right is not merely to the surface of his domain; he owns to the heavens above, and to the centre of the earth beneath. His right is unlimited, except by the equal rights of other land owners. He may build as high as he pleases, he may dig as deep as he pleases, but his right to do so does not deprive his neighbor who owns land of his right to do the same.

At common law, the rights of citizens in flowing streams, seem all to have been adjusted with reference to the ownership of land. Agriculture being the natural and primitive employment of the individual, as well as the interest most important to the state, held its rights by title paramount. The rights in streams and rivers are rights incident to land, and not independent estates. The riparian proprietors have the right to use the water, as it flows, for the better enjoyment of

their land, for household purposes, for watering their stock, and for irrigating their fields, provided they do not unreasonably diminish its quantity. No riparian owner has the right materially to retard or accelerate the current, to increase or diminish its natural flow, to the injury of others.

The right to raise a pond is not a right incident to ownership of the bank of the stream. A man owning one bank is presumed to own to the centre of the stream, that is, he owns the land covered with water. If he own both banks he may lawfully erect a dam, because that injures no one. If he raises a pond by that dam, as long as nobody is injured thereby, he cannot be interfered with, for nobody has a right of action unless he is in some way injuriously affected. But whenever the obstruction of the natural flow of the stream injures another's land, above or below, his legal rights are involved, and he may have legal redress, and insist that the water shall flow in its natural course. The owner of the dam can acquire no right to injure the land of another by his flowage, except by a grant from the owner. The right to flow another's land is a right in that land, a servitude or easement upon it, to use the legal phrases. It is an incumbrance upon it, which can only be imposed with the owner's consent, by his own grant or deed conveying it, or by some legal process of the state appropriating it to some public use.

In England, Parliament is deemed omnipotent. There is no power to declare its acts unconstitutional. It might grant the right to a company or person to flow the land of another, for the public good, as it has recently in several instances empowered companies to remove all dams and obstructions on certain streams, for the promotion of agriculture by drainage, providing in all cases for adequate compensation to the mill owners, and other injured parties. The course of legislation in England has always, it is believed, been favorable to agriculture. Reasons for this may, perhaps, be found in the fact that a large proportion of the land of the kingdom is owned by its legislators, as well as in the essential importance of agriculture to the nation.

In Massachusetts, and some other States, the constitution limits the power of the legislature over private property, to its appropriation to the public use upon full compensation provided.

The private right of a land owner is subservient to the public use, and by a construction of this power, now too well established to be shaken, it is settled in Massachusetts that the fostering of manufactures is so far a public interest that land may be appropriated by flowage, for the creation of water power to drive machinery, under the provisions for taking private property for the public use.

Upon this theory rests the flowage act, which authorizes the erection of a dam and the flowage of the lands of persons without their consent, compelling the land owner to part with the use of his land, for such compensation as a board of commissioners or a jury may award. It is interesting, however, to observe that this right, now seemingly adverse to the interests of agriculture, really sprung from a desire to promote the agricultural interest. It is believed that the first grants of flowage rights were limited to their use for "corn mills," it being essential to the very existence of the early settlers that their crops of corn should be converted into meal. As society progressed, the water powers thus raised were used for cloth dressing, and other purposes; similar grants were made for sawmills, and so by degrees the power increased until all the streams and rivers of the commonwealth have been subjected to a general flowage act, and agriculture has become, in some measure, subservient to manufactures.

Not only are most of the streams and rivers of the commonwealth deprived of their natural fall, by means of dams, but most of the ponds and lakes far back in the interior are raised far above their natural level in winter and spring, and drawn far below that level in the dry season, by means of dams and excavations at their outlets. These ponds and lakes are used as reservoirs for storing water for the use of mills and factories far below them on the streams, and the

control of the water by such means tends still farther to complicate the rights of parties below.

The whole subject of the rights of riparian proprietors as to the flowage of their lands seems now to have been adjudged to be within the scope of legislative action. The doctrine of common-law rights, which made the land owner lord of his soil, is overturned by the mill acts, to which reference has already been made.

The substance of the mill act now in force in Massachusetts may be thus stated. Any person may erect and maintain a water mill, and a dam to raise water for working it, upon and across any stream not navigable, upon certain conditions. Among those conditions are the following: That no such dam shall be erected to the injury of any mill above or below it, or of any mill site before occupied, and not lost or abandoned; that no such dam shall be erected on land of others, without his consent, and that the height to which the water may be raised, and the period for which it may be kept up during the year may be regulated by a jury.

Provision is made by the statute for compensation to the owners of land injured by the flowage, upon petition by them to the proper court, the damages to be assessed by a jury, both annually and in gross, the land owner having his election to receive his compensation in either form.

The Provincial Act of 12 Anne appears to be the basis of the legislation of the commonwealth upon this subject. The preamble of that act recites that it was intended to be applied only to "mills serviceable for the public good and benefit of the town or considerable neighborhood in or near to which they were erected," and it is provided that the jury shall determine "how far the flowing might be necessary and justified by the public convenience."

The *principle* upon which private property may be taken for mill purposes is, that it is appropriated to the public use. In all cases where the emergency is not pressing as to time, it is clearly just and proper that the fact that the public use requires the interference, should be ascertained by due form

of law, before the actual appropriation. In case of property required for war purposes, this might not be practicable, but there is no reason why the mill act should not provide for a hearing and condemnation of the property before it is taken. The present mill act of Massachusetts requires no notice before the erection of the dam, and no proceeding whatever on the part of the person who erects it, at any time. It puts the burden of seeking redress upon the injured party, and makes the mill owner defendant in the proceeding. Nor does the act in terms, nor by judicial construction, limit the appropriation of property by flowage, to mills only that may be useful to the public, but authorizes "any person" to "erect and maintain a water mill and a dam to raise water for working it, upon and across any stream not navigable."

In the details of the act, we think, the farmer may find cause for complaint. His land should only be taken for the public good, and after a judicial decree establishing the fact that the public good requires it, limiting the extent of the flowage, and fixing compensation.

The principle upon which the act rests is unquestionably sound. The application of the principle may, perhaps, be questionable. The operation of the mill act in the promotion of the interests of manufactures, has, no doubt, been most beneficent, and until, by means of drainage, the swampy lands near the streams began to be properly appreciated as the most valuable lands in the State, there was no general complaint on the part of agriculturists respecting it.

As all land has become more valuable, and low, wet lands have been found susceptible of more profitable improvement than any other, inquiry has arisen as to the right of the legislature to authorize the flowage of land without consent of the owner, and as to its power to relieve the land of the incumbent water, when the public interest may seem to require such action.

The views adopted by the highest judicial tribunal of the State have, upon all points, been eminently enlarged and liberal. The interest of manufactures, as has been already

said, has been recognized as a public interest, for the promotion of which private property may be taken under the provisions of the mill act, upon proper compensation to the owner. The power of the legislature to overflow the land of a citizen without his consent, through the appropriate processes of law, has not, perhaps, been seriously questioned for a generation. The power of the legislature to restore the land to the owner by removing the water thus artificially raised upon it, would seem to follow as an almost necessary inference,—yet this view of the subject seems never until quite recently to have attracted the attention either of the legislature or of the courts. In a recent case, however, the whole subject has been brought to the attention of the public, and of the legislature, and finally to the judicial consideration of the Supreme Judicial Court. A brief sketch of this proceeding, with historical, though not with minute legal accuracy, may claim a place in this volume.

At Billerica, in the County of Middlesex, a dam across the Concord River has long been maintained. It was erected in 1711, by one Christopher Osgood, under a grant from the town of Billerica, made to him, on condition that he should maintain a corn mill. In 1793, a charter was granted to the Middlesex Canal, and that corporation soon after bought the old dam and mill privilege, and in 1798 built a new dam, which remained till 1828, when the present stone dam was built. Since the disuse of the canal, a few years ago, the dam has been used entirely by the Messrs. Talbots, and others, for private manufacturing purposes.

The fall in the Concord River, above this dam, is ascertained to be not far from two inches to the mile for a distance of *twenty-one miles.* It is obvious, therefore, that a very slight obstruction of the current may affect the owners of land upon the banks, to a vast extent.

Believing themselves to be aggrieved by the maintenance of the dam at Billerica, the towns of Wayland, Sudbury, Bedford, Concord, and Carlyle, which lie along the banks of the river, in 1859, applied to the general court, by petition,

representing that large tracts of lands on and near the river were overflowed and injured by the water kept up by the dam at Billerica, and prayed for the removal or abatement of the dam, or other appropriate redress. These petitions were referred to a joint committee of the two houses, with authority to sit in vacation, and report to the next legislature.

This committee, after sessions of more than thirty days, and careful examination of the dam, and the river and lands, through their whole extent, made an elaborate report to the legislature of 1860, covering some five hundred printed octavo pages. They report, as conclusions, that more than ten thousand acres of land are injured by water raised by the dam at Billerica, and that through insufficient or improvident legislation in grants to the Middlesex Canal Corporation, the land-owners had never received any compensation for their injury.

Their report was referred to a second joint committee, which reported a bill providing for the removal of the whole dam. This bill, was, however, modified, and finally passed in a form which provided for the appointment of three commissioners, by the governor, with authority to remove thirty-three inches of the Billerica dam, at any time after the first day of the September following, and that when the same was removed it should never be rebuilt.

The act further provides that any person injured in his property, by the removal of the dam, may have redress by a specified process, with a final right to trial by jury, and that the damages thus ascertained be paid out of the treasury of the commonwealth.

To test the constitutional powers of the legislature to abate their dam in this way, the Messrs. Talbot procured a temporary injunction from a Justice of the Supreme Court, against the commissioners appointed by the governor, and a hearing was had upon a motion to dissolve the injunction, which resulted in an opinion of the whole court sustaining the act of the legislature. This opinion has not yet been published, nor has it been delivered in full. The principles, however, in-

volved in and established by it, have been announced by Chief Justice Bigelow, and will in due time be reported.

The court fully recognize the interest of agriculture as a great public interest, equal at least in importance to that of manufactures, and hold that, as by the mill act, the property of land-owners may, when the public good demands it, be appropriated to promote the interests of manufactures by covering the land with water to create water power for driving machinery, so, on the other hand, when the pnblic good requires it, the legislature, for the promotion of agriculture, may remove all obstructions to good husbandry, whether natural or artificial. The power of the legislature on this subject, for good, is limited only by its own discretion. Wherever the public interest requires its exercise, there may its power be felt. Whether the farmer's land be wasted by stagnant water by nature, or by dams or other artificial obstructions, the legislature has full power to authorize their drainage, not only by opening ditches through adjacent lands, under general drainage acts, but by special acts like that in question, just compensation in all cases being provided for all whose rights are injuriously affected.

This act and this decision of the Supreme Court mark an epoch in the history of agriculture. They place the great and leading interest of agriculture upon a strict equality with what has been regarded as the favorite interest of manufactures. The rights of agriculture are fully vindicated. The authority of the legislature to assist the farmer to the fullest extent, in thoroughly draining his land, is firmly established, and milldams and manufacturing companies are found to be no obstacles to its general power to promote the good of the commonwealth.

As agriculture progresses this will be found to be a principle of more and more importance. The streams are the great natural drains of the country. As deep drainage is more appreciated and put in practice, it will become manifest that vast tracts of valuable lands near the rivers, cannot be cultivated to the best advantage without drainage into those

rivers, and that no such drainage can be effected without removing dams and other obstructions, and allowing the waters to subside to their natural channels.

This subject is receiving great attention at the present time in England. Water powers are becoming less valuable there, because the tendency of thorough drainage is to send all the waters of the rains, in a very few hours, to the streams, instead of its remaining in the soil, and slowly yielding itself up for weeks and months, as it must do, when compelled to percolate through the undrained soil. Streams which formerly were uniform throughout the season are now found, in thorough-drained districts, to rise in tremendous freshets after heavy rains, and to become suddenly dry. For protection from these freshets, as well as to gain fall for drainage, measures are urged for the removal of all obstructions to the streams, and for deepening them and straightening their course. The British agricultural press abounds with articles upon this subject, under the titles "Arterial Drainage," and "River Drainage."

It is fortunate for the commonwealth, that its Supreme Court is keeping pace with the progress of an enlightened age, and guaranteeing to agriculture, almost in advance, the rights, which elsewhere have been reluctantly yielded or entirely denied.

The particular case which elicited the decision in question has not yet been definitively arranged. The act of 1860, authorizing the abatement of the dam at Billerica, has, by an act of 1861, been suspended during one year, for an investigation and report of a board of engineers as to the effect of the dam upon the lands lying on the river, the owners of the dam still insisting that it causes little or no injury to those lands. The report of this board will form the basis of future legislative action in the particular case, but the principles of law established by the court will remain unaffected.

LIST

OF

OFFICERS AND TRUSTEES OF THE SOCIETY

SINCE ITS ORGANIZATION.

PRESIDENTS.

Thomas Russell	1792 to 1796
John Lowell	1796 to 1802; 1823 to 1828
Caleb Strong	1802 to 1805
John Adams	1805 to 1813
Aaron Dexter	1813 to 1823
Thomas L. Winthrop	1828 to 1841
John Welles	1841 to 1846
John C. Gray	1846 to 1857
George W. Lyman	1857

VICE-PRESIDENTS.

John Lowell	1792 to 1796
Moses Gill	1792 to 1800
Joseph Russell, Jr.	1796 to 1807
Aaron Dexter	1800 to 1813
Theodore Lyman	1807 to 1809
Samuel Pomroy	1809 to 1823
Thomas L. Winthrop	1813 to 1828
Israel Thorndike	1823 to 1829
Thomas Handyside Perkins	1828
Peter C. Brooks	1829 to 1846
John Welles	1829 to 1841
Wm. Prescott	1841 to 1844

John C. Gray	1844 to 1846
Daniel Webster	1846 to 1853
Abbott Lawrence	1846 to 1850
John C. Warren	1850 to 1853
Francis C. Lowell	1853 to 1855
Wm. P. Mason	1853 to 1856
George W. Lyman	1855 to 1857
Charles G. Loring	1855 to 1860
Robert C. Winthrop	1857 to 1859
Thomas Motley, J.	1859
James W. Paige	1860

CORRESPONDING SECRETARIES.

Oliver Smith	1792 to 1797
Jonathan Mason, Jr.	1797
John Thornton Kirkland	1798 to 1802; 1805
Dr. Samuel Parker	1802 to 1805
John Lowell	1806 to 1823; 1828 to 1830
Richard Sullivan	1823 to 1828; 1330 to 1835
John Heard, Jr.	1835 to 1839
John C. Gray	1839 to 1844
Josiah Quincy, Jr.	1844 to 1853
Charles G. Loring	1853 to 1855
Robert C. Winthrop	1855
James W. Paige	1856 to 1860
Richard S. Fay	1860

TREASURERS.

Aaron Dexter	1792 to 1800
Thomas L. Winthrop	1800 to 1813
John Prince	1813 to 1827
John Heard, Jr.	1827 to 1835
Henry Codman	1835 to 1853
Thomas Motley, Jr.	1823 to 1859
David Sears, Jr.	1859

RECORDING SECRETARIES.

John Avery, Jr.	1792 to 1806
Dudley Atkins Tyng	1806 to 1809

John Thornton Kirkland	1809 to 1811
Richard Sullivan	1811 to 1823
Gorham Parsons	1823 to 1833
John C. Gray	1833 to 1839
Josiah Quincy, Jr.	1839 to 1844
Abbott Lawrence	1844 to 1846
Elias Phinney	1846 to 1850
Francis C. Lowell	1850 to 1853
George W. Lyman	1853 to 1855
Robert C. Winthrop	1855
Richard S. Fay	1856 to 1860
Peter C. Brooks, Jr.	1860

TRUSTEES.

Cotton Tufts	1792
Loami Baldwin	1792 to 1796
James Bowdoin	1792 to 1796
Christopher Gore	1792 to 1796; 1804 to 1806
Charles Vaughan	1792 to 1799
Martin Brimmer	1792 to 1805
Samuel Parker	1793 to 1899
George Cabot	1796 to 1805
John Codman	1796 to 1800
Theodore Lyman	1796 to 1807
Thomas L. Winthrop	1799
Fisher Ames	1800 to 1804
John Warren	1800 to 1810
John Thornton Kirkland	1802 to 1804; 1806 to 1809; 1815
Samuel W. Pomroy	1804 to 1809
Dudley L. Atkins Tyng	1805 to 1806; 1809
Josiah Quincy	1805 to 1809; 1813 to 1826
William Emerson	1806 to 1810
Ebenezer Preble	1807 to 1817
Peter C. Brooks	1809 to 1829
Samuel G. Perkins	1809 to 1816
H. Buckminster	1810
John Prince	1810 to 1813; 1827; 1832 to 1834
Gorham Parsons	1811 to 1823
E. H. Derby	1816 to 1840
Nathaniel Ingersoll	1817

John Welles	1818 to 1829
Aaron Dexter	1823 to 1826
William Prescott	1825 to 1841
Jonathan Amory	1826
John C. Gray	1827 to 1833
Richard Sullivan	1828 to 1830
James Jackson	1829
Israel Thorndike, Jr.	1829 to 1837
John Lowell	1830 to 1833
Daniel Webster	1834
Henry Codman	1833 to 1835
Josiah Quincy, Jr,	1834 to 1839
Abbott Lawrence	1835
Elias Phinney	1837 to 1846
John C. Warren	1839 to 1850
Francis C. Lowell	1841 to 1850
Levi Lincoln	1841
John A. Lowell	1842
David Sears	1844 to 1850
William P. Mason	1844 to 1853
Daniel P. King	1846
Martin Brimmer	1846
George W. Lyman	1847 to 1853
Charles G. Loring	1850 to 1853
Edward Everett	1850 to 1855
Thomas Motley, Jr.	1850 to 1853
Robert C. Winthrop	1853 to 1855
Samuel Lawrence	1853 to 1858
James Brown	1853 to 1855
George Peabody	1853
James W. Paige	1853 to 1856
Richard S. Fay	1855
Stephen Salisbury	1855 to 1860
William S. Lincoln	1855 to 1861
George I. Bigelow	1856
David Sears, Jr.	1857
George B. Loring	1858
Martin Brimmer	1860
William B. Bacon	1861