Public Documents of Maine:

BEING THE

ANNUAL REPORTS

OF THE VARIOUS

Public Officers and Institutions

FOR THE YEAR

1885

VOLUME II.

AUGUSTA:
SPRAGUE & SON, PRINTERS TO THE STATE.
1885.

AGRICULTURE OF MAINE.

TWENTY-EIGHTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

MAINE BOARD OF AGRICULTURE,

FOR THE YEAR

1884.

PRINTED BY ORDER OF THE LEGISLATURE.

AUGUSTA:
SPRAGUE & SON, PRINTERS TO THE STATE.
1885.

To the Honorable the Governor and Council of Maine:

In accordance with the law of the State, I have the honor to present the report of the doings of the Maine Board of Agriculture for 1884.

Z. A. GILBERT, *Secretary.*

AUGUSTA, January 21, 1885.

MAINE BOARD OF AGRICULTURE—1884.

OFFICERS.

S. L. HOLBROOK, PRESIDENT.
W. W. HARRIS, VICE PRESIDENT.
Z. A. GILBERT, SECRETARY.

MEMBERS CHOSEN BY COUNTY SOCIETIES.

			Term expires Dec. 31,
Cumberland County,	W. W. Harris,	Cumberland Centre,	1884
Oxford "	J. K. Hammond,	Paris,	1884
Sagadahoc "	S. L. Holbrook,	Brunswick,	1884
Somerset "	A. R. Smiley,	Skowhegan,	1884
York "	Horace Bodwell,	Acton,	1884
Aroostook "	Edward Wiggin,	Maysville Center,	1885
Franklin "	J. W. Butterfield,	Phillips,	1885
Penobscot "	J. E. Bennoch,	Orono,	1885
Piscataquis "	O. T. Goodridge,	Milo,	1885
Knox "	M. R. Mathews,	Warren,	1885
Lincoln "	J. J. A. Hoffses,	Jefferson,	1886
Androscoggin "	Nelson Ham,	Lewiston,	1886
Kennebec "	John E. Brainerd,	East Winthrop,	1886
Waldo "	D. B. Johnson,	Freedom,	1886
Washington "	A. R. Lincoln,	Dennysville,	1886
Hancock "	Vacancy.		

MEMBERS FROM STATE COLLEGE.

President, M. C. Fernald, Orono.
Professor of Agriculture, Walter Balentine, Orono.

ELECTED BY THE BOARD.

Z. A. Gilbert, North Greene, Secretary.

MAINE BOARD OF AGRICULTURE—1885.

OFFICERS.

EDWARD WIGGIN, PRESIDENT.
NELSON HAM, VICE PRESIDENT.
Z. A. GILBERT, SECRETARY.

MEMBERS CHOSEN BY COUNTY SOCIETIES.

			Term expires Dec. 31,
Aroostook County,	Edward Wiggin,	Maysville Center,	1885
Franklin "	J. W. Butterfield,	Phillips,	1885
Penobscot "	J. E. Bennoch,	Orono,	1885
Piscataquis "	O. T. Goodridge,	Milo,	1885
Knox "	M. R. Mathews,	Warren,	1885
Lincoln "	J. J. A. Hoffses,	Jefferson,	1886
Androscoggin "	Nelson Ham,	Lewiston,	1886
Kennebec "	John E. Brainerd,	East Winthrop,	1886
Waldo "	D. B. Johnson,	Freedom,	1886
Washington "	A. R. Lincoln,	Dennysville,	1886
Cumberland "	W. W. Harris,	Cumberland Centre,	1887
Sagadahoc "	S. L. Holbrook,	Brunswick,	1887
Oxford "	A. O. Pike,	Fryeburg,	1887
Somerset "	Geo. F. Moore,	North Anson,	1887
York "	J. M. Deering,	Saco,	1887
Hancock "	Vacancy.		

MEMBERS FROM STATE COLLEGE.

President, M. C. Fernald, Orono.
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ELECTED BY THE BOARD.

Z. A. Gilbert, North Greene, Secretary.

REPORT.

The annual meeting of the Maine Board of Agriculture was held at the office of the Secretary, at the State House, January 16 and 17, 1884.

The meeting was called to order by the Secretary, and the member from Franklin, J. W. Butterfield, was called to the chair.

A committee on credentials was chosen, consisting of

Harris of Cumberland,
Bodwell of York,
Bennoch of Penobscot,

who subsequently reported the following members duly elected:

Nelson Ham,	Lewiston,	Androscoggin County,
John E. Brainerd,	East Winthrop,	Kennebec "
D. B. Johnson,	Freedom,	Waldo "
A. R. Lincoln,	Dennysville,	Washington "
E. W. Stetson,	Damariscotta,	Lincoln "

The report was accepted and the above named members were admitted to seats on the Board. Subsequently E. W. Stetson resigned.

On motion of the member from Oxford, proceeded to the election of officers, and the following were elected:

S. L. Holbrook, President,
W. W. Harris, Vice President.

On motion, a committee on Pay Roll was appointed, consisting of

Wiggin of Aroostook,
Mathews of Knox,
Balentine of State College,
} *Com. on Pay Roll.*

On motion of the member from Franklin, an Advisory Committee was chosen, consisting of

S. L. Holbrook,
M. C. Fernald,
Nelson Ham,
} *Advisory Committee.*

On motion of the member from Cumberland, the requirements of last year in regard to the disposition of the stipend to agricultural societies were re-enacted for the year 1884, namely:

That the disposition of that part of the stipend paid by the State to agricultural societies, subject to the direction of the Board, be left in the hands of the several societies receiving the same, to be expended by them in a manner subject to the approval of the member of the Board for the county in which the society is located.

On motion of the member from Lincoln it was voted that each member, within thirty days after the adjournment, inform the Secretary on what subject he will prepare a paper to be presented at such time as may be desired during the coming year.

The following resolution was presented by M. C. Fernald of the State College, and was given a passage.

Resolved, That the establishment of an experiment station at the State College at Orono, for the analysis of fertilizers, foods and feeds, and for carrying on practical and scientific investigations in agriculture, is in the estimation of this Board a movement in the right direction, and that the best interests of our State demand that such station be established at the earliest practicable date. We therefore instruct our Secretary and the committee appointed to aid him to use all honorable endeavors to bring about this object.

On motion, a committee of three was appointed to aid in carrying out the intent of this resolution. S. L. Holbrook, Nelson Ham and E. W. Stetson were made that committee.

The work of the Board, as being conducted, received the following endorsement:

Resolved, That this Board appreciates the efforts of its Secretary to advance the standard of agricultural science and practice in the State, and that we thoroughly endorse his plan of institute work and the manner in which he is conducting it.

REVIEW OF THE YEAR.

The work of the year on the farms of the State has been rewarded by a fair degree of success, without being marked by extremes in any respect. A stronger feeling of confidence in farming as a business is surely, though slowly, gaining ground among the farmers, and is the means of introducing methods which call for the employment of more labor, and the use of more capital, and which result in an increased production of important staple products.

The crops of the year, while falling off in yield in some directions from the year previous, in other directions have been especially bountiful, so that the general average for the year in the products of the soil did not fall much below the usual standard.

Grass fell off from the yield of the two previous years, both in pasture and field. The hay crop was estimated in the State at large at three-fourths of the yield of 1883. This makes the aggregate crop in the State for 1884, 1,038,542 tons. This varies but little from the figures as given in the census of 1880, and showing the crop to be about an average of a series of years. There are no data, of course, from which to estimate the pasturage, further than that the causes which tended to reduce the hay crop affected grass in pastures to a like extent. There was a large amount of old hay brought over from the abundant crop of the year before, which has enabled farmers to carry about their usual amount of stock. The weather during the season of haying was unfavorable in the extreme, and as a result much hay was more or less injured, and some was housed without being sufficiently dried.

Corn as a profitable crop on the farm is being more and more appreciated by the farmers of the State each year, and as a consequence, the breadth devoted to the crop is gradually widening. The breadth of sweet corn for canning was only about one-half that of the year before on account of the falling off in the demand for the canned article. The amount put up was about 5,000,000 cans.

The area in yellow corn was increased from the year before owing in part to the growing appreciation of the crop, and also to the reduction of the sweet corn crop. The yield per acre was about an average, and the aggregate crop of the State is estimated at 1,200,000 bushels.

The potato crop did not yield as high per acre as in the year previous, and the total crop outside of Aroostook County did not reach the yield of the year previous. In Aroostook County, however, the yield was up to an average, and the area is annually on the increase. The aggregate crop of the State, as a whole, reached about the same amount as the year before—12,000,000 bushels, while above 5,000,000 bushels of the crop was grown in the county of Aroostook. The rot did not prevail to a serious extent.

As good a grain crop as was ever grown in the State was harvested this year. The area in the various grain crops was fully up to the usual amount, and the yield to the acre was at least twenty-five per

cent above an average. The total of oats for the State is placed at 3,500,000 bushels, wheat at 800,000, and barley 350,000.

The apple crop was an abundant one, at least twenty-five per cent above an average. There are no data from which to make a reliable estimate of the total crop. The large increase in the number of bearing trees, and especially the better care they are receiving from their owners, has increased the apple crop of the State immensely; while the reputation for keeping which Maine fruit has acquired, has given it a value in the market second to no other. The fruit crop of the State the present year has been the source of a large revenue.

There has been no essential change during the year in the live stock interests of the State. Prices have slightly toned down from a year ago in nearly all kinds of live stock. On account of the low price of wool, owners of sheep are looking more to mutton and lambs for their income from their flocks, and as a consequence the "mutton sheep," so called, are gaining in ascendency, while for the time being the Merino flocks are not increasing so rapidly as formerly. Fat lambs have sold for full prices during the year. On the whole, the number of sheep has slightly fallen off during the year, estimated at ten per cent.

Beef has ruled slightly lower than in 1883, and the number of animals fed and sold has been at least ten per cent less than in that year.

The horse-stock interests of the State are maintained in full importance. Choice animals for breeding purposes are being brought into the State in larger numbers than at any previous time.

Pork products have ruled low, and the feeding of pigs has brought to the operator only small returns.

The dairy interests of the State are in a thriving condition. The few remaining cheese factories are doing a thriving business in manufacturing cheese. This line of the dairy business is finding much favor in Aroostook County, where it is especially well adapted to their situation. The prospect is that it will find a further expansion in that section.

The creamery method of butter making so far is proving well adapted to the conditions found here prevailing. There have nine creameries been put in operation in the State up to the present time, all of which are now making butter, which are named and located as follows:

Sabattis Mountain Creamery ..... Wales
Winthrop Creamery..... Winthrop
Turner Center Creamery ..... Turner Center
New Gloucester Creamery..... New Gloucester
Gorham Creamery..... Gorham
Machias Creamery..... Machias
St. Albans Creamery..... St. Albans
Skowhegan Creamery..... Skowhegan
Poland Creamery..... Poland Corner

So far, the butter made at these creameries has compared well in quality with that from other establishments of the kind in other States, and has found a ready market.

With the increased attention which is everywhere being given to the different stock interests and to dairying, the tendency is to divert attention, in a measure, from the practice of selling hay, which has prevailed to a large extent in some sections of the State. It is being learned, that, under good management, hay may be made to return as much to the owner when fed out as when sold.

The agricultural societies, transactions of which will be found in another place, in the main have held successful exhibitions, and are in good standing financially. It will be seen by the returns that nearly all of them are free from debt, and that many of them own parks with substantial fixtures. The most successful societies, as a rule, are those embracing a large territory, or a whole county; while in those counties where the territory has been divided and sub-divided into several societies, the exhibits are of limited extent, and the financial transactions of small account, and the interest in its success of like extent.

The State Agricultural Society and the State Pomological Society are models in the way of organizing, systematizing and carrying on their exhibitions.

The Eastern Maine State Fair held a successful exhibition at Bangor, and proved by its success that our State is large enough in territory, and the stock and products meritorious enough in quality and numerous enough in extent to make up two great fairs in the State each year, and that when made up and well governed there is patronage enough for both.

Farmers' Institutes.

The Institute work of the year has been carried on in the same manner as in former years. An Institute has been held in each of the counties of the State during the year, and in the counties embracing the largest territory two have been held. These have been well attended. A record of the work in each county is herewith given, with such of the lectures and discussions as the limits of this report will allow.

HANCOCK COUNTY.

Institute at Dedham.

The Institute for Hancock County was held at Dedham Town Hall, by invitation of the citizens of the town, on Wednesday, November 5. The day was rainy in the extreme, necessitating the cancelling of the programme arranged for the forenoon. In the afternoon and evening there was a full attendance.

The subjects assigned for the day were as follows:

Poultry and its Profits; by Dr. G. M. Twitchell of Fairfield.

Fruits for Hancock County and How to Grow Them; by the Secretary of the Board.

Milk and its Secretion; by Prof. Walter Balentine of the State College.

No report of the exercises is here given.

CUMBERLAND COUNTY.

Institute at Gorham.

An Institute was held at Gorham, November 12, by invitation of the Gorham Creamery Association, for the special purpose of encouraging the co-operative enterprise of butter making recently started in that town. The attendance was good, and a lively interest was manifested in the lectures and discussions.

The meeting was opened by the Secretary of the Board in explanation of the work laid out for the day, after which a lecture was given upon the subject,

BUTTER MAKING AS A BUSINESS.

By O. M. TINKHAM, Secretary of the Vermont Dairymen's Association.

There are two things that embarrass me a little in appearing before you on this subject. The first is the vastness of the subject of dairying, the very many different aspects in which it may be viewed, the different phases which it presents; and the second is my ignorance of it.

I come as a learner rather than as a teacher. The only thing I can hope to be able to do is to give you a little of our experience in Vermont, and in return I expect to carry back from the meeting here an equal amount of intelligence that shall be available to my brother farmers of that State. I am glad that this is to be a social meeting. There can be no meeting of intelligent farmers where the social spirit prevails, where questions are asked and answered, that will not be valuable in its results. I can answer any question which you may ask, but you will find out before I get through that my favorite answer will be "I don't know."

What are we farmers after? The honest dollar. Now, how can we make it? We look at our country as it was seventy-five years ago, when the lawful tender was neat cattle, or corn at so much a bushel, and we remember that then the Genessee valley was a great way off. We raised our own cattle and our own grain, and cleared our own land. In a little while the grain had moved westward and we had become more of a dairying section, and we used Genessee

flour. In the next decade or two the flour district was crowded off into Ohio, and New York became also a great dairying section. Now the grain district has been pushed westward from Ohio; and Illinois, Indiana, Michigan, Wisconsin, Minnesota, Nebraska and Colorado are raising our bread stuff. We cannot compete with them successfully, with their vast areas easy to cultivate, in raising bread stuff or cattle. Then we must depend upon those products, more delicate in character, requiring more care, more intelligence, and accessibility to market; and of these butter and cheese I think stand pre-eminent.

Then who should engage in dairying? I would not advise everybody to take up dairying. The time is past when it was thought anybody must know as much about everything as anybody else. In short, I believe the time for general farming, as producing the best results, is past. The whole tendency of the world is toward specialties. The man that does the best thing is the man that gives his whole time and attention and talent to that thing. To be successful, a man should select some particular line and hold to it. You have men among you, like a neighbor of mine when I was a boy, who, in describing a cow that he wished to sell, said that she was a nice cow, orderly and peaceable and gave a good amount of milk, but, said he, "she is an awful homely traveler." That man's boys, at six years of age, would take out a pair of horses and handle them in a manner to shame many men. They were given to horses, and it was a great thing against a cow that she was a "bad traveler." Now you see it would not do for a man of that kind to go into dairying. In the western part of Vermont we have men that are wooled clear down to their ankles, I suppose, and they keep fine wooled sheep, and they make a great deal of money, because all their reading and thought and attention are in the direction of the production of fine wooled sheep. The same is true of dairying. The man that likes a cow, that likes to be around them, that will take care of them, that will not only see that they have the best of feed and the best of care, but will give his intelligence and intellect to the product of the cow, is the man to take up dairying.

If I were going to make butter, I would have a cow. I do not think I have a very strong liking for butter that is what you might call steer butter, or hog butter—made of various articles that we do not know much about. So, I say, if I was going to make butter I would have a cow; and if I were going to keep a cow, unless I

were a very rich man, I would have a good cow. Nobody but a rich man can afford to keep a poor cow. Having a good cow, I would pursue exactly the same course with her as I would with a good carriage. It naturally follows that when a man has invested in a good article he takes better care of it. A man who has an interest in dairying and has a good cow will take better care of the animal, and the cow will surely repay that care.

It has been held by some people that the feed of the cow made no difference particularly in the quality of the butter. I think it has been very plainly demonstrated, within the past year or two, that the feed of the cow does have a very marked influence both on the quality and the quantity, although I am not quite sure whether the quality may be as much improved as the quantity may be increased. But it certainly is true that the amount of butter made from a cow that is richly fed, and fed with that view, is largely increased. This is shown in a marked degree by the yield of Princess 2nd, 27 pounds 10 ounces, and of Mary Ann of St. Lambert, 36 pounds 12 ounces. It may be of interest to you to know how Princess 2nd was fed. I went and saw Mr. Richardson, who has charge of Mr. Shoemaker's herd, near Baltimore, as the yield seemed to me almost incredible. I asked Mr. Richardson how he did it. "Well," said he, "I will tell you; in the first place I had my men pick off eight pounds of clover blossoms—the very richest and best of all hay fodder; those were steamed, and with the steam or water added made about 24 pounds of steamed hay. Then we gave her about 8 pounds of corn meal, 8 pounds of shorts, and an equal quantity of cotton seed, and roots of one kind and another. This was her feed every day." He said, "At each milking I set aside some of the milk in a test tube to see which feed would give the greatest amount of cream, varying a little each time, taking off a little of the roots or putting on a little meal, until I found out which of these feeds gave the largest yield of cream." That being ascertained, he went on feeding her in that way for the week's trial, with the remarkable result which has been given. In the trial of Mary Ann of St. Lambert, a somewat similar course was pursued. In that case pea meal entered largely into her feed. No one particular feed would give the best result; a variety of food, with cattle as well as with men, gives a taste for it, and more is eaten. I believe that a cow's production is only limited by the amount of food you can induce her to consume, and her ability to digest and

assimilate that food. It is just as it is with a steam engine, the amount of steam depends on the amount of fuel consumed; and the amount of butter depends on the amount of food utilized.

Sometimes, when I have been before meetings like this, I have been asked by those who knew that I was a breeder and user of Jersey cows what I considered the best breed of cows. I answer that I can tell them that when they will tell me what they consider the best farm implement. If I wanted to break up a piece of ground, certainly I do not think I would take a scythe to do it with. The best cow is the cow that will best do what you want done. If I were making milk to sell I would try to find the cow that would give me the largest amount of fluid that I could sell for milk. The quality of the milk I should not care so much about, so long as the customers did not "kick" too badly. Looking simply to the amount of milk, I should use the Ayrshire, or Holstein cows. If I wanted to make beef by grazing, I would take the Herefords or Shorthorns; if I wanted to make it by stall feeding, I would take the Polled Angus; if I wanted to make butter, I should take the Jerseys.

I remember, about twenty-five or thirty years ago, a neighbor of mine, of whom you may have heard, Mr. Whipple, an enterprising young farmer, with that complement so essential in the making of a good farmer, a good smart wife, had on his place four cows of the native breed, and by careful attention to his business he succeeded in securing, over and above what they consumed in their little family, four hundred pounds of butter in a year, one hundred pounds per cow. That was thought to be such an extraordinary yield—he had such an amount of butter, that he concluded he would go to Boston with it himself, although he lived one hundred and fifty miles from that city; and he obtained in that market for his butter the almost equally remarkable price of twenty-five cents per pound. That was thought a great thing. A few years after that we began to get in a little Jersey blood; and in about fifteen years from that time, from a dairy of twelve cows, Jersey and Jersey grade, with the better feed and the better care which better stock naturally brought in its train, this man had increased the yield from one hundred pounds to three hundred pounds per cow. In the

mean time had come on our war; and high prices following a depreciated currency, and a greater consumption in proportion to the number of producers, he was able to contract his butter for sixty cents a pound, and was able to do so year after year, even after prices came lower.

It has been found with us that the introduction of Jersey cows has trebled the yield of our dairies and has augmented the price. Yet you must bear in mind that it is not the cows alone that have done it. Better cows have naturally introduced better care and better attention, and all these together have given us a larger product and better prices.

We have in Pomfret, and, indeed, in the State at large, almost exclusively private dairies as yet. There is a very great drawback to this, not so much with us in a lower price, as in the extreme amount of work it brings on the part of the family least able to bear it—the women. I come here personally to learn of the effects of co-operative butter making, which I know is established in Maine more than in Vermont. One reason, I suppose, why we still hold to our individual dairying is that we have got into it and have established a good market for our product.

All butter makers, of course, think they make good butter. I am a pretty brave man, but I should not very much like to go into a family and intimate that they didn't make good butter, unless I had a good way to retreat. But the person who makes butter is not and cannot be, of necessity, a good judge of butter. Why? Because it is his own product that he sees week after week and year after year, and he does not have much opportunity to compare it with that made by other people; and we are apt to like what we are accustomed to. I do not see how a man can become a good judge of butter unless he has an opportunity of comparison. It is a good deal as Artemas Ward said about his lectures. He said, "For the people that like my kind of lectures, my kind of lectures are just such lectures as such people like." For people that like a certain kind of butter, that butter is just such butter as those people like. The best butter to make is the butter that will please the people that are the best able to pay for being pleased, and are determined to be pleased at whatever cost. Last spring I was in the market in Boston, and heard them speaking very enthusiastically of the Dar-

lington butter, made near Philadelphia, as a remarkably fine flavored butter. I wanted to know what it meant and I went down there, and was treated very courteously by the Darlingtons. I looked around and made as good use as I could of my eyes and Yankee tongue, and I concluded that one reason, and perhaps the great reason, why their butter has brought such a price, is that, as Mr. Darlington told me, he and his father and his grandfather have made butter right along in the same place for seventy-five years, and he is to-day supplying the same families that his grandfather supplied seventy-five years ago—and those are the wealthy families in Philadelphia, New York and Boston. The Astors and the Vanderbilts have been using that butter, have been brought up on it, and naturally think there is nothing equal to it; and good butter is to them of more importance than a little money. They have always known where they could get it. The names of the producers have been on it, and having got the market they have held it. They could not have done it if their butter had been poor, but it was by combining the two things together that they have met with this success.

To come back to where we started, to our Vermont business. Perhaps the reason why we still hold to our individual dairying is that we have got our names somewhat known in the market; we put our names on the boxes, and stamp them on the butter itself when we put it up in prints. Don't you see how natural it is that a man will give a few cents more a pound for his butter under those circumstances?

Jones, a dealer in Boston, receives some butter from Mr. Whipple with Mr. Whipple's name on it; he sells it to Smith; Smith eats the butter and is pleased with it, and when he wants some more butter he naturally goes back to Jones and says:

"Have you any more of that butter such as I got here last week?"

"Yes; I have just had another shipment from the same man, Mr. Whipple, up in Vermont."

"Well, I like that butter; you may send me a tub of it."

Don't you see that the man that sells the butter in that way prizes it? He knows where to get it when he wants it.

Suppose that dealer has a number of customers who come in and call for Mr. Whipple's butter every week, and by and by Smith comes in and says:

"Have you any of that Whipple butter?"

"No; the fact is there is getting to be a great demand for that butter, and it sells out pretty quickly."

"Now, look here, Jones, I like that butter and I want you to save me some hereafter."

"Well, I shall have to charge you five cents a pound more, but if you say keep it, I will keep it."

"Well, I shall not stand on five cents; you may save it."

So you see that carries up the price, the demand for it necessitating a supply. There is a rule that is as broad as the world, that the price is regulated by the relative demand and supply of an article. Suppose, now, another man comes in and says, "I understand you are selling Mr. Whipple's butter for thirty-five cents; now I have just as good butter as Mr. Whipple's, and I will let you have it so you can sell it for thirty." Don't you see it is not for the interest of that dealer to take that butter, because he has got to work up a demand for the new brand, while the old would sell itself? So you see how important it is to identify yourselves as closely as possible with the consumers, that they will know where their butter comes from and how they can secure your butter when they want it.

In the estimate of the farm in Newport, that Col. Waring stood at the head of, the good will of the farm was estimated at $10,000; that is simply the business reputation of the farm among its customers. That is an item which we have to a great extent lost, by not being identified with our customers. It is in this one thing that the creamery must get the advantage over the ordinary individual dairyman, because dealers know that at the creamery they can get a good article every time. Another thing is the greater probability of getting a uniform article from the creamery than from the individual dairymen, because conditions are more likely to be equal. The variations in feed and in conditions in the herds will not affect the whole mass as much as if the butter were all made from one herd.

There is another advantage in co-operative dairying, and that is, that while all of us present may make good butter and be careful about it, we may have neighbors who are not so careful as they should be in making butter, and theirs will not sell as well; but

when the cream is brought into the creamery one person handles it all, and the butter from their cream brings as high a price as that from ours.

SEC. GILBERT. Is it your experience in Vermont that the quality of butter determines its price in open market?

MR. TINKHAM. Yes, until that butter has a fixed standing in the market, when it sells on its reputation to certain customers. The dealer, of course, understands when there is trouble in a particular brand of butter, and the maker is very liable to hear of it at once. We had at our dairymen's association meeting last year an exhibit at which there were shown over eighty samples of butter. That the thing might be passed upon as justly as possible, I went to Boston and got an expert, a butter dealer in Faneuil Hall market, to come up and judge our butter for us. The samples of butter were placed on tables around the room, and all the expert knew about them was the numbers which were placed under them. By whom it was made, or where, or from what cows, or from what feed, he was entirely ignorant. He asked on what basis he should make up his judgment, and I told him to class as number one that butter that he would put on his shelf to sell as number one butter to people that came in inquiring for it, that being of the same grade as the best of Iowa creamery. Of those samples he rated over seventy-five per cent as number one butter; there were sixteen samples which were rated as number two, three as number three, and one as number four. The number two butter was what would sell for but a cent or two a pound less than the number one, and that largely on account of its flavor. In looking over my report I found that eleven samples of the butter were made where ensilage was fed. I find on looking over my minutes of the remarks of the expert as he went along, that eight of those eleven samples were placed among the number two. The remark he would make when passing upon those samples would be, "Some flavor here that I am not familiar with; I don't like it; suggestive of oysters." I found that that particular flavor was spoken of where ensilage had been used for fodder. Do not understand me as saying that you cannot make good butter when ensilage is fed; I do not say any such thing. It is said that an Irishman, after tasting an apple pie flavored with quince, remarked, "If apple pie is so good flavored with a little quince, how fine it would be made all of quince." It does not follow by any means, because you cannot make good butter where your fodder is all ensilage, that you

cannot feed any of it and make good butter, nor that ensilage has no value as a feed. Neither is the sole use of cotton seed meal advisable. The most successful dairyman is the man who, among other things, will best work in all those feeds that can be profitably and judiciously used. I haven't a particle of doubt that for store cattle ensilage may be used with a great deal of profit, or that for milch cows, when given in limited amounts, to take the place of apples, potatoes and turnips, it has a value. But I do not believe a man can feed sixty pounds of ensilage per cow per day without flavoring very perceptibly both the butter and the milk.

A word in regard to feeding for the flavor of the butter. The peculiar success of the Darlington butter is due to its flavor. It is no better in grain than many other makes, but the flavor was so fine that some have thought they had some secret flavoring for it. I remember one gentleman said he thought they might possibly have a happy combination of salt, sugar and saltpetre. I could not find anything of that sort about the manufacture of their butter, and I do not believe there was anything. In our exhibit in Vermont last year, I remember one sample of butter, made by a friend of mine, that was very highly commended by the judge, for its fine flavor, and he remarked: "Good hay, heavily clover." And when I was at the Darlington Farm, I looked around there and not a particle of hay could I find, of any kind, but clover. I said, "Mr. Darlington, I think I have discovered the secret of your butter flavor." He said, "What is it?" I said, "Clover hay;" and he remarked, "I guess you have struck it" He said, "Last winter I used just as good Timothy hay as ever was cut, for bedding, because I could not get straw, and I would not feed the hay." He told me he bought three hundred tons of Clover hay yearly; that he fed nothing but clover; that he would not take the best Timothy that ever was grown, as a gift, to feed to his cows. He lays great stress on feed. He said that a short time before, a car-load of corn meal had come for his farm in his absence, which had soured a little, and his foreman very properly refused to take it from the car. He said the dealers who had forwarded it were very much hurt because he would not take it at a little less price. Said he, "I could not have taken it if they had given it to me; it would not only have reduced the quantity of the product, but would have deteriorated the quality as well, and I should have had complaints coming in."

I think we do not pay attention enough to the feed we give our cows where we wish to make first class butter. I know it is sometimes said, when a cow is allowed to eat a few frozen cabbage leaves, or a little poor hay, that it is nothing but a cow and it will do well enough; but in my opinion careful feeding is necessary to the best product in butter. Our experience has been that the more attention we give to the feed and care of the cows the better results we get in our butter.

Question. What do you say to cotton seed meal?

MR. TINKHAM. I do not think I would feed cotton seed meal if I wanted the best butter. By that I mean I would not give two or three or four quarts a day. A very little cotton seed meal or linseed meal, sometimes called oil cake, may be used to make up a mixed feed that might be better than any single feed.

Question. In what proportion would you mix corn meal, cotton seed meal and shorts?

MR. TINKHAM. I used to put in about equal quantities in bulk of ground oats, shorts or bran, and corn meal, and then add about one eighth as much of cotton seed meal, but with the uncertainty that has attended its use I have discarded cotton seed meal altogether, preferring to be clearly on the safe side. I do not think pure, sweet cotton seed meal is injurious; but any of you that have been South know that there are great bins there, where cotton has been ginned, containing immense quantities of cotton seed, and in many cases it lies there exposed to the weather until it sours and ferments; and I have no doubt but that is taken to make oil of, and some of it is ground and brought North. It stands to reason that that kind of cotton seed meal may be injurious, while that from a really perfect seed that is sweet might be entirely healthy. We all know that cotton seed oil is largely in use for human food in one form and another. Indeed, in my own neighborhood it has been introduced to take the place of lard in shortening, and with very satisfactory results. It is a little unpleasant in flavor, but it is not unhealthy. But while I have not experienced any of this difficulty arising from cotton seed meal that is pure and sweet, I do think it is certain that cotton seed meal cannot be largely fed without its presence being detected in the flavor and consistency of the butter.

Question. In this exhibit of butter that you have mentioned, were any of the samples which were ranked as number one made where ensilage was used?

MR. TINKHAM. I cannot give you the exact figures about that, because one sheet of my notes was taken by somebody who evidently thought they had a value; but I know that in one or two cases, certainly, where ensilage had been used the butter was classed as number one.

SEC. GILBERT. What were the test characteristics which made your judge place one sample as number one, and another as number two?

MR. TINKHAM. There were three prominent characteristics that constituted the basis of his judgment—grain, color and flavor. Every sample was bored through its middle and tested, to avoid any of the effects of exposure to the air. He would say of one sample, "good color, good grain, but a little off in flavor; this might have been good butter when it was made, but it has been kept too long; the freshness is all gone;" of another, "good color and good grain, but salted too much;" of another, "good flavor and good grain, but poor color." And right here I will say, I asked him whether he would rather have a butter of perfectly natural color but a little white, or the same butter colored; and he said, "color it; we want our butter as near the color of June butter as we can get it." Sometimes he would take up a sample and say, "salvy, it has been worked too much—number two." That was the tenor of the remarks he would make in classifying the butter. I would say that the peculiar way in which it was put up didn't seem to amount to much with him. There were little pats stamped with beautiful roses and pineapples. but he somehow didn't seem to appreciate the force of their beauty, and they didn't seem to affect his judgment a cent's worth. He made no difference between roses and pineapples. There was one sample—a nice little plain, square block, and he said, "I like the looks of that first rate; it looks clean and nice." And so it did, with nothing to mar the beauty of its golden color.

Question. Have you any knowledge of the proportion of ensilage in the feed of those cows whose butter made up the eleven samples of number two that you spoke of?

MR. TINKHAM. Some of them say ensilage twice a day and hay once a day; and some say ensilage once a day. Some of those that feed the heaviest with ensilage say feed a bushel twice a day, and some say once. That is all that I had to guide me.

I should not omit to state that there was one sample of which the judge said, as he came to it, "Pretty highly colored, this, too much

so." It was in four little pats in a tin box with glass over it. It was shaded from the window, so that when he took it out of the box it didn't look as deeply colored as he thought at first. I happened to know where that sample came from, and I told him, after he passed his judgment, that it was not colored at all. He tasted it, and he said it was the best sample he had struck. He said, "If I had that butter in my market I could sell it for 60 or 70 cents," and "that it came strictly within the line of what is termed 'fancy butter.'" That butter was made by a friend of mine, who makes his butter in this way. He skims his milk twice, to make his first quality butter that he sends to the market, because the largest globules rise first.

Question. What does he set his milk in?

I think he sets it in a refrigerator, in cold setting, and I guess in deep cans. He feeds early cut hay, heavily clover, and salts the butter lightly to suit the particular taste of those that like lightly salted butter. After skimming he sets his milk still longer and takes off the cream to make a second grade of butter. I was there once at dinner, and he said he was giving me second class butter, that he could not afford to use the best in his family. To show you the value of the expert's judgment, I will state that this man was then getting 70 cents a pound for his butter right along week after week, and this judge, who fixed the figure at 60 to 70 cents, had never handled a pound of it in his market.

I am sometimes asked how much I would salt butter. If I had a customer that liked it so, I would put a pound of salt into a pound of butter, because it comes cheaper. All the rule I know is, salt your butter to suit your customer. Find out who is going to use your butter, and how he likes it; get him to think he cannot possibly do without your butter. In Vermont we salt all the way from one fourth of an ounce to an ounce in a pound. It will make a difference whether you work your butter after salting, because a portion of the saltness may be worked out.

Question. How about washing butter?

MR. TINKHAM. That would depend on how my customer liked it. When I made a practice of keeping my butter over I used to wash it, and I remember once when I carried it to market the dealer said that it was very good butter, but it would have been better if I had not washed it. He said, "If you are going to let me have your butter next year, don't wash it at all." There is a certain flavor,

that some call a buttermilk flavor, that is lost in washing, and some dealers will tell you that the washed butter is not so sweet and the flavor is different. Some say that washed butter will not keep so long. The next year I didn't wash my butter, and I got five cents a pound more because I sold to the same man. But it is a great deal less trouble to wash your butter than it is to undertake to work out the buttermilk without it. After I draw off the water I take the butter out on to the butter board and sprinkle on the salt. And, by the way, I want to describe to you a little article that I got up. It may be perfectly familiar to all of you, but I never had seen one until I got it up myself. It is a common pint cup, the same size all the way up, with a little handle to it, and in lieu of an ordinary bottom it has a perforated tin bottom, with holes about the size of a pin. The holes are small enough so the salt will not run through when it is perfectly quiet, but with a little shaking the salt will sprinkle evenly over the surface of the butter. The great object is to work the salt in evenly with the least possible working. It is very difficult in the ordinary way to get your salt so there will not be any lumps in it.

Question. How many times would you work your butter after salting?

MR. TINKHAM. I would not work it but once after that. The question is, How can we get the salt thoroughly incorporated with the least amount of work? I believe I can do it by putting on the salt after the butter comes from the churn, letting it stand twelve hours, and then working it again. It does away with the streaky appearance of the butter. I suppose you have all heard of the man who went to the store to sell his butter and the store keeper asked him how he accounted for the streaky appearance of the butter, and he said, "You ought to see the cows: they are a good deal streakeder than the butter." Salt acts as a sort of a mordant to the color in the butter; it deepens the color. You take a portion of the butter that is unsalted, and it will be lighter in color, and if the butter is not thoroughly worked it shows badly. After I put the salt on I work it till I start the brine a little and I think I have got it pretty well incorporated, and then I let it stand for twelve hours and work it again.

Question. What do you think of this method: Reducing the temperature of the wash water sufficiently to leave the butter in

granules, having it down to fifty-four or fifty-two, and stirring the salt in?

MR. TINKHAM. We have never used that method. The churn that I have in use is not suited to that process.

Question. Does not working the butter after it has stood twelve hours work out some of the salt?

MR. TINKHAM. Yes.

Question. How do you know how much to put in?

MR. TINKHAM. We put in an ounce of salt to a pound of butter and work it so much, and we know that it will leave enough in to suit the taste of our customers. I do not know how much is left in, but I know how much we put in, and how much to work it to suit our customers.

Question. Would there not be this advantage in stirring the salt in, that you would not have to work the butter so much? You can let it set till the salt is dissolved and then give it a light working.

MR. TINKHAM. I am not at all certain that may not be a good way.

Question. Isn't there difficulty in getting it salt enough in that way?

MR. TINKHAM. There is this to be considered. This little granule of butter is an individual body, and in stirring it you can readily see that you would not incorporate the salt into the individual granules, but it would be distributed in the interstices between the different granules. So I should say you would have to give it a little working, any way.

I would say that the practice is universal, among our dairymen, of sending our butter to market as fast as we make it, in weekly shipments. Our customers prefer it that way, and it saves us all the trouble of saving it.

AFTERNOON SESSION.

SEC. GILBERT. It is not often that we get a Vermont man down here into Maine, and so while we have one here we want to get as much out of him as possible. There are one or two questions which I wish to ask, and I doubt not there are many questions that others have in mind, which we wish to ask the gentleman before we relieve him from the arduous position which he has so kindly filled for us. We are all aware that dairying has attained a prominent position in

Vermont. We are trying to encourage that business in the State of Maine, and particularly to encourage its extension here in this neighborhood; and I would like to inquire of the gentleman if the business is still holding up in importance in the State of Vermont as a special feature of the agriculture of the State.

MR. TINKHAM. I can say, in regard to that, that the market for good number one butter is just as good now as it ever was. Of course the demand for a fancy article that will sell for sixty or seventy cents a pound must necessarily be limited. Only the wealthy can afford to pay those prices. There are some people who are not satisfied with butter unless they pay those prices for it, just as there are some who are not satisfied with an overcoat unless it costs them sixty dollars, but the number of such customers is proportionately small. The demand for good number one butter, such as will wholesale in Boston for about thirty cents, and retail at thirty-five, is as active now as it has been since our monetary basis has come back to gold. Good butter is in demand, and will be in demand.

There is one point that it seems I did not make myself clear about this forenoon. I stated that associated dairying did away with the poorer butter. I meant to have had it understood plainly that the average in anything is secured at the expense of the best and to the profit of the poorest. You can readily see, that if everybody made just as good butter as you and I do, associated dairying would be very equal, and the butter would bring even a better price than it does now. But we have a neighbor who is not careful in his feeding, nor in the handling of his milk, and a flavor gets into his cream that lowers the standard of the whole product. But the average product of that locality is raised by the fact that the better is mixed with the poorer. It is like mixing several grades of sugar, including sand, of course; the more good sugar you put in with the poor the better product you secure.

If it were not for the presence of these ladies I should like to speak of something; but you see it is necessary to maintain our supremacy in the family, and I don't know as it is quite safe to make any confessions of any negligence on our part. However, I think I will run the risk to just hint to you quietly that there is a great deal of butter spoiled before it ever gets into the house, though of course we must have it understood that the ladies are responsible for all the poor butter. Without cleanliness in the stable you cannot

make good butter. We must look out for the scents about the house, from drainage and other causes; because cream will take up odors as readily as anything in the world. Do you know how the scents for our handkerchiefs are obtained? Flowers are taken and placed on layers of fat, which will extract the scent better than anything else; then the fats are cut by alcohol, and as the scent has a greater affinity for alcohol it is secured in that way. So it is with our cream, which is a fat; it will absorb bad odors just as readily as sweet ones. Of the many rules that are laid down by eminent dairymen, I know of but one that cannot be broken with impunity by an intelligent butter maker, and that is cleanliness. You may set with deep setting or shoal setting, cold setting or in sixty degrees, and just as good butter may be made in one way as the other, by intelligent dairymen, with equal cleanliness.

Question. Is the business of butter making in Vermont on the increase?

MR. TINKHAM. It is on the increase. Our increase this season over last is considerable. Where we have sent our butter week after week to the same parties, with our names on it, we have been gaining a reputation to our great profit.

MR. LITCHFIELD. It is generally understood that the State of Maine has no particular standing in the market as a dairying State, as the State of Vermont has. Will you tell us what condition Vermont possesses which gives her the advantage over the State of Maine?

MR. TINKHAM. Well, I hardly know. I think one thing may be that we entered into it earlier and have held the market longer. Then there is another thing that perhaps may give us an advantage. Our land is set up edgewise, you know, so that we cultivate both sides of it; and the soil on these uplands is a loam that is very quick and in tolerable good heart; the grass feed upon it is excellent. We have pure running water from our hills. A man there never would think of buying a pasture for his cows, that had not a good stream running through it from which they could get water. We have held our supremacy in butter more on our summer product. When it comes to a winter product, where we feed dry feed and grain, the West will make just as good butter as we can, and they have the grain right there. So our June butter has held its supremacy in the market from our rich feed and pure water in our upland pastures. In Boston, Providence, New York, and even in Philadelphia you

will see signs put out advertising Vermont butter; but you all know that probably not one-third of the butter that is sold under that name is really Vermont butter. We have tried to make the best butter we could, and we are reaping the benefits that come from a business honestly and thoughtfully conducted for a long time.

Question. Are there any particular localities in Vermont more noted for their product of butter than others?

MR. TINKHAM. Yes, but that is getting more evenly distributed than it used to be. Franklin County butter used to have the highest reputation and command the best prices. One reason for that was that they gave attention to it earlier than other counties. In my recollection, in my own town of Pomfret, we used to keep cattle and sheep; but I will venture to say that in that town there are not ten sheep where forty years ago there was a thousand. In their place you find now Jersey cows. In Franklin County they went into it largely, and have many large farms where they keep a hundred cows and give their attention to making butter. Now Windsor, Orange and Caledonia counties have some of the best dairying regions in the State. In Orange and Windsor counties there are places where butter is shipped largely in prints every week, and they intend to run their dairies so that they shall ship just about such an amount every week through the year. Some of them contract to furnish fifty or one hundred pounds a week through the year to certain parties who expect a uniform quality of butter, and are willing to pay good prices for it.

Question. Will you not tell the ladies more about this streaked butter that you spoke of this forenoon?

MR. TINKHAM. I cannot tell you any more than that I think it is due to the presence and non-presence of salt in the butter. You may take a churning of butter and divide it into two parts, and salt one part as you would salt it for use and set it away twelve hours, and leave the other part unsalted, and then bring them together, and you will see that the salted part is of a deeper color than the other. The salt acts as a mordant, as you may say, to set the color. The yellow in butter, as I understand it, comes from the green of the feed. Your grass is greener in summer, and your butter is yellower. You feed clover hay that is cut at the right time and cured nicely, and you get butter that is a little lighter than that which you get in summer; you put your cattle on to late cut herds-grass hay, and you get a still lighter color in your butter; and you

put them on to rye straw and you get rye straw butter. So the yellow of the butter comes from the green of the foods, the chlorophyl, as it is called, and salt acts as a mordant to deepen that color. Your streaked butter you will generally find is butter that has not been sufficiently worked to work the salt in evenly. It is a pretty nice thing to strike just the right point to work your butter, so it will not be streaked on the one hand nor salvy on the other.

Question. Are your dairymen in Vermont ever troubled with flecks in manufacturing butter, which appear to be small particles of curd?

MR. TINKHAM. Those white flecks arise from two causes. If you set your milk in a shoal pan in a draft of air, the metal being a greater conductor of caloric than the atmosphere, you will find the cream right around on the inside of the pan, next to the tin, will be dry and hard; and then if you pour it into the cream can and it stands there two or three days, you will find specks on the ladle that you stir it with if you leave it in there, and some up on the sides of the cream can. Those are so thoroughly dried, the butter globules are so thoroughly impacted together, that they never will assimilate with the rest of the cream, and when the butter comes, those will still remain particles of unchurned cream. To prove that: when you wash your butter, skim those off carefully and take a case knife and a plate and work them over thoroughly, crushing them together, and by and by you will have butter made from them. Another cause is where too much milk is taken off with the cream, and the cream stands too long, until the milk at the bottom of the can is sour, and not only sour but wheyey, and this matter is formed there. When you come to wash your butter you see white specks, but they are of entirely different character from the others.

Question. Is it possible in any way, having obtained such a product as that, to separate the butter and these flecks so as not to have them mixed?

MR. TINKHAM. You can approximately in washing. And to do that the more thoroughly you should do the washing before the butter has aggregated into a mass; take it in the granular form and agitate it, and the white flecks of unchurned cream will rise more readily. The cheesy matter is more difficult to separate because it is heavier and will not rise so readily, and it is a matter of a great deal of trouble to separate them in that condition.

Question. Is it possible to avoid those difficulties?

MR. TINKHAM. It is. The first is avoided by deep cold setting. The second you will avoid by not allowing your cream to stand until the milk in the bottom has become sour and has wheyed off. Then at times in the fall of the year there are difficulties which cannot be accounted for. There is my friend Cheever, who has made his butter for a great many years and sold it at a high price, and he says that sometimes in the fall of the year it seems as if the butter would not come, and he cannot discover any reason. And I have had the same experience; I have thought the temperature was right, that I had fed the cows as usual, but still the butter would not come for a long time, and when it would come it would be unsatisfactory.

Question. Hasn't the time that the cows have been in milk something to do with these difficulties—cows that have been a long time farrow?

MR. TINKHAM. That makes a difference, but still I do not think it will account for all of these things. Of course the butter will come more readily from the milk of a cow that is fresh in milk than from that of one that has been long farrow. Now, the amount of a certain cow's milk that it will take to make a pound of butter will vary every day; a cow that at one time will make an ounce of butter from a pound of milk, a little later, on another feed, will make two ounces of butter from a pound of milk. I have had that exemplified in my own herd, with individual cows.

Question. What is your method of setting your milk?

MR. TINKHAM. I have set mine always in small pans, until I came across what is called the bureau creamery, which is a series of four pans, one above the other, and two wide. It is similar in effect to shoal setting, only in large pans, and it is an improvement in that way. For keeping the temperature down in summer ice is put in above these pans. And when you wish to get at your cream you can pull them out as you would if they were drawers in a bureau.

Question. At what temperature do you keep your milk?

MR. TINKHAM. I intend to keep it at about sixty degrees, but through carelessness and inattention it varies considerable.

Question. Do you keep it the same in summer and in winter?

MR. TINKHAM. I intend to.

Question. Is your bureau ventilated?

MR. TINKHAM. Yes; there are ventilators which may be opened at the ends until all the animal heat has gone, and then they are closed up, after the milk has got down to the temperature of the outside air.

COMPARATIVE PROFITS OF BUTTER MAKING AND THE SELLING OF MILK.

DISCUSSION.

SEC. GILBERT. One of the considerations connected with the extension of the butter-making business in this State which we have had to encounter is the comparison between butter making and the selling of milk. We find that dairymen who have been located where they could sell their milk have to a certain extent outstripped our butter makers in their apparent prosperity. We have been making some investigation as to the real cause of their advantages in the situation. There being here a butter factory located in close contact with individuals who are selling milk, it becomes an imporant question for consideration whether the milk sellers are having an advantage over the butter makers, or *vice versa*. As it happens, we are favored this afternoon with the presence of your county member of the Board of Agriculture, who has some knowledge upon this matter, and also another gentleman who has long been identified with the dairying interests of the State; and, as your member of the Board has requested, I will call upon Mr. Cobb of Poland first for some remarks, to be followed by Mr. Harris, upon this subject of the comparative merits of the two systems of dairy work.

MR. COBB. *Mr. Secretary and Ladies and Gentlemen:* This is the first time that I have had the opportunity of coming before you in this county in a meeting of this kind. I was first asked by the secretary to speak upon the question of selling milk, as that has been my business for twenty-one years, until last June. I am a firm believer in a farmer's choosing a specialty and following it as his business. He should be careful to select that branch for which he is fitted, and then he should make that his life work. A true dairyman loves cows. When he is travelling on the road the first object that attracts his attention is a cow. He will love his business, and he will need to in order to make it a success. It is easy enough to love the business when it is bringing in a satisfactory number of the dollars that we are all striving after, but not so easy in periods of depression; and there are such periods in the dairy business, as in other occupations. There is scarcely a month in the year that does not bring a change in his profits. But you will find that the men in this State who have persevered in the dairying business have

been successful; they are men who have got better farms; men who have brought up their boys to have an interest in the farm.

Many of you have sold milk and know well the outs and ins of the business; you know the early hours and the extreme patience and care that are required. It is not all sunshine. It is first rate when the market is calling for every drop of milk you can produce; but when the times come when you have to keep your milk at home for two or three days in the week, it is not so pleasant; you have no conveniences for making butter, and that milk is almost a loss, and if you have twenty or thirty cows the loss is considerable. Sunday's milk is usually kept at home. I peddled my milk in the cities of Lewiston and Auburn for ten years, and then, and indeed during all the time that I have sold my milk, it has been work early and work late. When you ship your milk on the cars you are obliged to get up so as to have your milk ready on the moment required or you have lost the sale of your whole product for the day. On the other hand, the person who contributes to a butter factory is not required to rise at so early an hour in the morning. But he is compelled to feed his cows as well and take as good care of them as if he were selling milk. In selling milk you get your pay once a month in money. In the ordinary way of making butter the pay comes when you can get it, and you sell your butter for whatever price you can get. But in the butter factory system you get your pay in cash once a month; so in that respect it is like selling milk.

The cause of my changing was compulsion. On the first of last April I wished to contract twenty cans of milk a day for one year, but I could not do it in Portland where I was selling. Consequently, on the first day of June I contracted for my cream at the door with the New Gloucester Butter Factory. They come to my house and receive it every day. During the month of June and until the tenth of July I had ice, and the figures then were a little in favor of the sale of cream at the door, in comparison with the selling of milk at the depot, without considering the skim-milk. I received a little more for the cream than I formerly had for the whole milk. After the tenth of July I had no ice and then I used cold water, cooled by coiling a lead pipe in the bottom of the well, and the lowest temperature I could get was about sixty or sixty-five degrees Then the sale of the cream went behind the sale of the milk until the cool weather of September came on. I was able to sell most of the skim-milk at my door for one cent a quart. I had had two hundred

quarts of milk a day through the summer. I was an unbeliever in butter making, and I have kept a strict account ever since the first of June. The final figuring is not to be made until the end of the year, to know just how we are coming out; but I am giving you the result for the few months that it has been tested. Since this cool weather came on the temperature of my milk has been about thirty-six, and the sale of the cream has paid a fraction more than the sale of the milk would. So, for a few weeks in the hot weather, when I was without ice, I was losing, but since the cool weather came I have been gaining.

There is a young man in my neighborhood, who formerly worked for me, but who has now gone to farming for himself, and he keeps a herd of fifteen cows. He sends milk to Portland. He was obliged to keep his Saturday's and Sunday's milk at home. A week ago last Saturday he came and borrowed my Cooley cans to set his milk in, to try it. He had no better place to set it than on a bench out doors. His Saturday's milk was eighty quarts, and he measured his cream with my rule, and reckoned it the same amount per inch that I have for mine, and the cream would have brought him seven cents more, at his door, than he would have got for the milk at the depot, three miles away. These cows were not selected for butter making either; there was not a Jersey in the herd of fifteen. The next day he tried it again, and it came off warm, and they were away in the afternoon and the sun shone right on these cans, and there wasn't so much cream, and the value of that cream was twenty-one cents less than the price of the eighty quarts of milk, reckoned in the same way as on the day previous. That experiment was fairly tried, without prejudice either way.

The speaker this forenoon referred to the question of ease for the woman of the house. There is also a question in that respect on the part of the men. Does it pay to lie awake half the night for fear of losing the train in the morning? The gentleman that I have always sold my milk to in Portland wrote me ten days ago asking me to bind myself to furnish him twenty cans of milk a day and set my own price, but I wrote him that I could not, that we were going to start a butter factory in my own town. Yesterday morning he came to my house saying that he must have the milk, no matter about the price. Previous to the starting of these butter factories how did they talk? When they were paying us thirty-five cents a can, deliv ered in Portland, they said, "You must come down to thirty cents,

because we can get it on the Portland and Rochester Railroad for thirty, and we cannot give you any more." Then we had either to meet them with a stiff back bone or come down to their price. About six weeks ago they wrote that same language to their supplying milkmen on the Grand Trunk, and they braced right up, without saying a word to each other, and replied, "We will not sell you one quart of milk if you drop the price below thirty-five cents a can." They came with those same words in their mouths then, that there were men on the Portland & Rochester road that would be glad to sell for thirty-two, and it was all they asked. When these Portland men were met with a flat refusal to submit to their cut down they wrote in a very different style, saying, "If you cannot furnish it for less than thirty-five cents we will give it." Where were those men on the P. & R. road that wanted to furnish it for thirty-two cents? I say the more butter factories we have the better the business is.

Right upon the line of the road where I live there are eight persons who have among them one hundred and fifty to one hundred and seventy-five cows. At a meeting, the first of this month, we decided to build a butter factory and take cream from the farmers of our town and make it into butter, and pay them once a month for the cream received. Our factory will be about fifteen miles from the New Gloucester factory. They have come from that factory to my neighborhood, twelve or thirteen miles, to collect the cream of fifty cows—thirty of my own and twenty of my neighbor's.

Now, I wish to say right here that the secret of getting cream for the butter factory is in the cows that you keep. I had thirty cows, such as I was selling milk from. Some of them were not fit to make butter from; they would give from sixteen to eighteen quarts of milk a day, but not much cream; there were some five or six Jerseys in the lot. I am making changes, putting in Jerseys in the place of the other breeds. I dislike the looks of a Jersey cow, but I do like the looks of their cream, and the money that comes from it looks just about as well as if the cows were handsome.

My nearest neighbor, who embarked in this at the same time I did, had ten cows. His cream, during the summer, did not measure so much by from one to one and four-eighths inches per can as mine did. He set a great deal by his cows and he didn't wish to change them. He had thought that they were not very good butter cows, and they proved not to be so. He kept along until the first day of November and then changed back to selling milk again, as he must

necessarily do if he was bound to keep that lot of cows. No one can tell what a cow will do until she is tested. I have about decided that I will not buy a cow to sell cream from without first testing her yield of cream.

Question. What was the breed of those cows?

MR. COBB. Those were common cows that cost about forty dollars apiece.

Question. Were they fed about the same as yours?

MR. COBB. Yes, they were pastured right side by side. In June and July I never feed any grain; all the rest of the year I do. I feed mixed grain and cotton seed meal. The mixed grain that I think should be raised for cows is peas, wheat, oats and barley. That is a rich feed and will give very satisfactory returns in cream.

SEC. GILBERT. How much value do you give to the skim-milk that you retain upon your farm? You say in all probability it hasn't cost you anything as compared with the selling of milk.

MR. COBB. Some months it has cost me something, and some it has not. My wife said to me in the month of August, "we are not getting so much money as when we sold milk." I said, "I know that, but let us reckon up and see." I reckoned up and found that we had grown from that skim-milk two hundred and thirteen dollars worth of pigs, reckoning them at their cash value at that time, and had raised nine calves, and one pair of steers that I could have sold at that time for forty dollars.

Question. How much fertilizer did you leave on your farm besides?

MR. COBB. All there was. In these meetings I have often heard the value of skim-milk set at one cent per quart in the summer time, and that is the price I have set to sell it for, and people will readily buy it at that price. Then I experimented. Three pigs were separated from the rest, and I weighed them once a week and fed them skim-milk. We carried out just so many cans every two or three days and emptied them into a barrel so the milk would sour, and fed them from that; and, reckoning the gain on those pigs at what pork would sell for upon hogs, this turned me about eight and one-half cents per can of eight quarts. The pigs were from eight to twelve weeks old. I was satisfied and so I fed more.

Question. How many pigs can you keep to a cow, if you feed them on skim-milk?

MR. COBB. You could not keep a great many pigs three months old; but while they are from six to eight weeks old you can keep eight or ten with two or three cows.

Question. Do you find skim-milk a good article to raise calves on?

MR. COBB. I do.

Question. Do you feed calves with sour milk?

MR. COBB. Yes, only it is somewhat difficult to teach them to eat cold sour milk; they take more readily to the warm skim-milk.

SEC. GILBERT. How many former milkmen, so called, are to be associated with you in the butter factory in your neighborhood?

MR. COBB. There are fourteen that have been delivering milk at the Mechanic Falls and Empire stations, that have pledged themselves to furnish cream for this factory at Poland Corner for one year. That will carry us through the warm weather and the cold, and we can see whether it will be profitable to engage longer in it. They did not, in the New Gloucester factory, pledge themselves for any length of time, and they feel that it was a great injury to them.

MR. TINKHAM. In Vermont we consider it very important to keep the skim-milk at home. Our great need is fertilizers. We consider that the manure that comes from the keeping of pigs will pay for all the trouble of taking care of the milk after the cream is taken off, and all the trouble of taking care of the pigs, and leave us a little profit besides. That seems to me to pass directly to the credit of skim milk at home. I do not know what may be your experience. Perhaps in Maine you are not as much put to it for fertilizers as we are in Vermont. Take the fertilizer from these hogs of mine away for one year, and I should be compelled to reduce the number of my cows the next. It is the salvation of the farm—the fertilizer that comes from the stock, and the more stock you keep the more business it makes for you the next year, and consequently you must work harder or else keep more hired help. If you are ambitious to keep a few more every year, you can do it if you will look out for the fertilizers and are willing to work.

CHAIRMAN. In further consideration of this matter of butter as against milk, we will now listen to a few words from Mr. Harris of Cumberland.

MR. HARRIS. *Mr. Chairman and Ladies and Gentlemen:* I was a little selfish in my request to be left until the last, for I supposed the thing would happen as it has, that the time would be pretty well taken up, and I should not be under the necessity of saying much.

I can most heartily endorse what has been said by the different speakers in favor of butter making. Dairying is the most stable, substantial business that we can be engaged in. While the prices of different farm products are fluctuating to a considerable extent, good butter keeps nearer its highest price than any other one article that we can deal in. I find no difference in price in my butter the year through; it makes no difference to me whether butter is high or low, I get the same price. Others can do the same thing; all you have got to do is to make a good article and you are sure of a good price.

Mr. Cobb has given you his experience in regard to the relative profits of butter making and selling milk. His experience is somewhat similar to mine. I followed the business of selling milk in Portland some seven or eight years, and I became disgusted with dealing with the milkmen, and changed to making butter; and I have never regretted the change. In the first place, I know that I have got a market for my entire production of milk, in the form of butter; I haven't got to coax any milkman to take an extra quantity of milk, or anything of the sort. My grocer who buys my butter only complains that he does not get enough of it. I should say that my cash receipts for my butter alone are not quite so large as they would be if I could sell all my milk; but I never could find a man yet who would take my whole milk product all the time; there were always times in the flush days of milk when I would have to keep two or three cans at home, and that, while not a total loss, would cut down the profits. But the residue which is left behind in making butter is a very important factor. A man who sells milk sells the fertility of his farm. Of course it is not very perceptible as he goes along, but if he has a large herd and is producing considerable milk it will make quite a difference in a few years' time. A man who sells butter sells no fertility from his farm. It seems to me that this is a very important consideration, when we bear in mind that by a little loss of fertility every year the farm will in time become worthless.

I think the suggestion of the gentleman this forenoon, that in associated dairying the product is raised above the average of private dairying, is a valuable one. And this will be more marked, after a few years of experience, than it is to-day.

It seems to me that one reason why Vermont takes so high a place in this industry of butter making is because she was driven into

it early by her location, being an inland State, with no commerce, and at a considerable distance from the great markets, it was necessary that her farmers should make a specialty of some product that could be marketed in a condensed form. I remember, when I was a boy, living in the upper end of this county, the farmers' teams used to come down by our place every winter loaded with butter, pork and cheese, and then taking their groceries back home. There would be processions of twenty or thirty double teams. For a long series of years these Vermont farmers have followed this business of butter making, and their butter has become a standard product. Not so with Maine. Our long line of sea coast has given us cheap transportation to the great markets, and we have been producing a little of this and a little of that, and until within a few years we have not given much attention to dairying as a specialty. When a man tells me that we cannot succeed in the business as well as they do in Vermont I disagree with him. We have good grass land; we have pure water; and we ought to have intelligence enough to take care of our cows as well as they do in Vermont; and we ought to be able to manipulate the products from those cows as well as they do in Vermont. If these things are true I would like to have some one tell me why we may not make as good butter as they. They have a reputation from the fact of having been long in the business. It is known to some of us that there are as good makers of butter in the State of Maine as anywhere. We have butter makers in this State that have been selling their butter for sixty cents, and that is a pretty good price.

This combination of dairying and raising pigs and calves is a wise one. Then there is no waste product, and the fertility of your farm is kept up. I am raising fifteen calves this year upon skim-milk. If I had been selling milk I could not do this thing; but by making butter I have had something to feed the calves and quite a number of pigs. All things considered, I find great advantages in butter making over the selling of milk.

Question. Do you feed your calves sweet milk or sour?

MR. HARRIS. I feed my calves with sweet skim-milk, as it comes from my Moseley creamery. The milk is as sweet as when it comes from the cows, and when fed is about the temperature of new milk.

Question. Do you make your butter at home?

MR. HARRIS. I do.

Question. What are you getting for your butter?

MR. HARRIS. My butter sells for forty cents the year round in Portland to a certain set of customers. The man who distributes it gets five cents a pound out of that for his pay, leaving me thirty-five cents a pound.

Question. What is the cost per pound of your butter to you?

MR. HARRIS. I am sorry to say I cannot answer you. The work of manufacturing it is not kept separate from the other farm work; it goes in with the other work. My men milk; the milk is turned into the cans in the Moseley creamery, and when it has set twenty-four hours the milk is drawn off; the cream is drawn off into cream pails where it stays till we call it ready for churning. The woman sees to that; but when it is put into the churn a man takes it and churns it, and washes it, and works it; in fact, about all the woman is called on to do in the matter is to look on and see that it is properly done. When you ask me what it costs to do that I cannot answer you.

MR. TINKHAM. Did you ever meet a man that could tell, that could demonstrate to your satisfaction, just what it costs to produce a pound of butter?

MR. HARRIS. I never saw him.

MR. TINKHAM. I never did.

SEC. GILBERT. With regard to this matter of cost, you will see that in a private business like that, where it is mixed up with other work, it is an absolute impossibility to tell exactly what it will cost to make a pound of butter. In our factory work it is somewhat different. It was my privilege, a few days ago, to look over the books of the Turner Butter Factory, covering their operations since they commenced, the first of last February. Up to the first day of October the cost of the labor of collecting the cream and making the butter and packing it into firkins ready to be delivered, was two cents six and one-half mills a pound.

Question. How much do they make?

SEC. GILBERT. Their product ran from one hundred pounds at the commencement, up to three hundred or three hundred and fifty at the maximum. The buttermilk was not taken into consideration. There is a credit coming from the sale of buttermilk that has more than paid the incidental expenses of the factory. During one month of this time the butter was manufactured for an even two cents a pound.

MR. TINKHAM. I want to emphasize what my friend Cobb said about the value of skim-milk. Up on our Vermont hillsides we have been drawing from our bank account, which is a bank of earth, and we have come to the conclusion that it is with that just as it is with any other bank, that you cannot keep drawing out unless you keep putting something in. Some of our hillside banks have failed because this rule has not been observed. Now if any of you ladies want to know the value of skim-milk as a fertilizer, just reduce it about one-half and put it on to your plants in the window. I believe that the value of skim-milk has been lost sight of to a great extent. As Mr. Harris has stated, that comes from the soil, and only from the soil. The butter itself comes from the air. The man that sells his butter doesn't sell anything from his land. At one time, when I was having more skim-milk than I could feed to my calves and pigs, I threw some of it upon the ground, and in three weeks' time I could trace, by the increased growth of grass and the deeper green, just where the milk went. It is worth a good deal even to be applied directly to the ground as a fertilizer; and when you feed it to animals and get the growth on them and also a return in fertilizer, you get a good deal from your skim-milk.

SEC. GILBERT. We have with us a representative from the town of Winthrop, a town where the dairy interests have been developed to an extent greater than in any other town in Maine, and I will call upon him to give some statements in regard to the appreciation in which this business is held in that town, and how it is carried on.

MR. L. K. LITCHFIELD of Winthrop. The compliment paid to the town of Winthrop I fully appreciate, and I believe it is warranted by the facts in the case. We have been there studying for years this matter of associated dairying. When we established the cheese factory in the town of Winthrop, in 1874, we could count four hundred cows in that town. To-day the dairy animals in the town of Winthrop number eight hundred or more. We attribute the increase to the establishment of the cheese factory, and we think we can show that that is the fact. A year ago this present month our butter factory was started. We thought that we had got to the point, as dairymen, when something had got to be done. We had increased our dairies to such an extent that we could not handle our milk at home. We had been finding all the way along that there was money in it; that there was profit in it; that there was benefit to the farmers

in it; and we had kept on raising our calves and holding on to them until we had got to the point where the question of labor became a very important one, and where it was necessary to make a change. We think a great deal of our women, and we saw that they were carrying too great a burden. The establishment of the cheese factory removed a part of the labor; but during the winter season, when the cheese factory could not run, we had an increase of hard work for the women, and to such an extent that we had to do something about it. Consequently we talked up this creamery business, and established our factory a year ago. The increase in dairy stock has been steadily going on during the past year. We have continued to run the cheese factory, keeping it in operation from the first of May till the first of October. The profits have been figured up to that extent that we have become satisfied that the two things can be run in connection—one a part of the year, and the other the entire year. We see the results of the prosperity of this business of associated dairying all over the town of Winthrop The farms are better than they were. The patrons of the factories are satisfied with the result, so far as I know, and we propose to take no steps backward. I do not suppose the patrons of the factories could be induced to take up the old methods again. Of course we naturally expect to do better the coming year than we have our first year. We have learned something by experience, and expect to learn more. The expense of gathering and manufacturing the cream may be reduced from what it has been costing us; the quality of the product may be improved, and a better market may be secured. Our farmers are satisfied that they are making more money from the proceeds of their dairy through the present system than they used to when they manufactured at home, in addition to being relieved of so much of the hard labor. We are not quite satisfied with the expense of gathering our cream, and we expect to reduce it. We have some expensive routes. One route is eleven miles directly out, and the bulk of the cream gathered on that route is at the extreme end of it. If we had cows all the way along it would reduce the expense of gathering, because one man could gather twice the amount of cream that he now does at the same expense. All of our routes are somewhat extended, and the expense of gathering our cream is quite large.

Question. Do we understand that the man who lives close by the factory gets no more for his cream than the man that lives eleven miles out?

MR. LITCHFIELD. Every man gets the same. The company pays all the expenses and they are taken from the amount of the money returned. Our butter factory has been running since a year ago the present month, and we have made as high as 2100 pounds per week, and at no time, I think, less than 175 pounds per day. During the warm season the butter was placed in cold storage in Boston. We have had no returns whatever from the June and July butter, but we are assured by the person who is handling our butter that we are to receive probably twenty-five cents a pound for that produced during those hot months. Other months it has been bringing us more. At the present time I think we are getting the outside quotation, and the butter is increasing in reputation. We are striving to improve the quality, and that is the true theory to work upon, as we have been told to-day. In this matter of associated dairying the whole thing depends on the quality of the butter. If a few of the patrons are allowed by any carelessness or lack of interest to contribute an inferior article of cream, it will injure the quality of the whole product and of course reduce the profits. The only hope for any butter factory, in my opinion, is to keep the quality of the product up to as high a point as possible, and not in any event allow any patron to injure it by contributing an inferior article of cream. As has been said, the quality of the creamery butter is established not by the lowest contribution nor the highest, but by the average. If we have a few uncleanly patrons, careless patrons, they are going to reduce the quality of the butter and consequently the profits from it.

Question. In your opinion is there any serious difficulty in keeping the quality of the cream up to the proper standard?

MR. LITCHFIELD. No, I do not think there can be any difficulty. I think the business is showing itself to be so advantageous to the patrons that they will be careful not to reduce the quality of the butter by contributing inferior cream. There are always, of course, individual cases where carelessness will creep in. A patron of our cheese factory reduced his milk fifty per cent with water, thinking he would not be detected. We became satisfied that something was wrong, and made a test, and he was caught and excluded from the

business. And the consequence of this vigilance has been that the product of our cheese factory this year has been better in quality than ever before. Farmers will see that to make associated dairying profitable they must all unite to keep the standard up. If they only succeed in that the profits will take care of themselves.

PENOBSCOT COUNTY.

Institute at Hampden.

By invitation of the Penobscot County Farmers' Club—A. G. Kent, President; J. E. Shaw, Secretary—an Institute was held at Hampden Town Hall, November 6th. The Club furnished entertainment for all in attendance.

The programme included a lecture on Improvement of Soils, by Hon. J. O. Adams, Secretary of the New Hampshire Board of Agriculture, which is omitted from this report. R. W. Murch of Hampden read a paper on the same subject, and remarks were made by J. E. Bennoch, member for the county, and Nelson Ham, member for Androscoggin.

POULTRY FOR PROFIT.

By Dr. G. M. Twitchell, Fairfield.

Mr. President, Ladies and Gentlemen: In discussing the question of poultry raising, having to deal with fractions rather than whole numbers, we must consider every detail, and count carefully the cost, that we may rightly understand the per cent of profit possible. Underlying all success are principles suggested in a former paper, and which must receive brief notice here. I have thought it best to discuss to-day the financial side of the question,

and so present a few figures for consideration. Cheap, warm, inexpensive buildings, sufficient to accommodate five hundred hens, can be built at a cost not exceeding two hundred and fifty dollars.

Five hundred young hens can be purchased at this season of the year, November, for fifty cents each, a total of two hundred and fifty dollars. The cost of feeding runs from ninety cents to one dollar per head. In my own case it has not exceeded ninety cents, but allowing one dollar a head for feed, we have five hundred dollars as the year's expense. One thousand chicks can be hatched and raised until five to six months old, for forty cents each,—four hundred dollars.

The interest on the building and eight acres of land, sufficient for the number indicated, at six per cent, would amount to thirty-nine dollars. Here we have as the year's expense, in addition to care, eleven hundred and eighty-nine dollars.

What may we expect as receipts?

The average egg production per hen is claimed, by authorities, to be from one hundred and fifty-five to one hundred and eighty-five annually. But, unless extra care and attention is given, these figures cannot be realized, and we will base our calculations on eleven dozen—one hundred and thirty-two. This number we may expect our flock of five hundred to produce, and we market five thousand five hundred dozen. The average price in Maine the past year has exceeded twenty-two cents per dozen; but, at that price, we should receive twelve hundred and ten dollars. Now, the hens are worth to kill, their first cost, and, in addition, will pay for the natural loss by disease and accidents—estimated to be from eight to ten per cent. Here we find we can receive two hundred and fifty dollars. Now we have one thousand chicks, and from these take five hundred pullets for next year's operations, which are worth two hundred and fifty dollars. The remaining five hundred are worth, or may be made worth, in the market, from ninety cents to one dollar a head. At ninety cents they would amount to four hundred and fifty dollars. We have then, as the total receipts, not counting the dressing, two thousand one hundred and sixty dollars, or a profit of almost two dollars per head—on paper. Can these figures be realized in actual practice? This is the question uppermost in the mind of everyone interested in the subject.

In order to secure the number of eggs indicated, the flocks must be intelligently cared for. The hens dressed and sent to market at the proper time, will sell at almost chicken prices, and that time is when they stop laying and before moulting commences. The genera appearance of the bird will tell the story to an observing breeder. They must be dressed before the pin feathers start, else they sell only as fowl. The chicks can easily be made worth from one dollar to one dollar and a half, if the proper breeds are kept, and they have sold the past season, in the Boston market, for twenty eight cents per pound. We have in mind one lot dressing five and one-half pounds, hatched in May and marketed in September, which brought that price, averaging five and one-half pounds each. To-day our poultry sells as much on its appearance as its condition, and this fact is what gives extra prices to certain lots. A knowledge of the laws of breeding is necessary in order for anyone to succeed, for in mating and breeding, as well as caring and feeding, there is need of the application of these laws, and the higher the appreciation of them the better the results. We must bear in mind that our flocks and herds did not always exist as we find them to-day. There was a time when they roamed the earth, and their only purpose was to perpetuate their species. But man has taken these animals, and, applying his skill and intelligence, century after century, has gradually, "through the survival of the fittest," been reaching out towards perfection. The little wild bird of the forest and jungle has been domesticated and, in her nature, almost completely transformed.

Instead of producing eggs to-day, as the quail and partridge, we find that the intricate machinery is constantly at work making shell, yolk and albumen. Think, for a moment, what study, skill and intelligence has been given, and we to-day reap the benefits. Now it is a fact that we cannot stand still; we must either advance or retire, and we have only to neglect the laws by which present results have been attained, in order for our poultry to revert—slowly, it is true, but surely—to their original state. Here we find an explanation for so many failures. Paying no attention to the flocks, neglecting to care and feed properly, they very soon become unproductive, and their eggs infertile. It would be well if we could sometimes consider the hen a machine, capable of taking the grain we give it and converting into eggs or flesh, as we may feed. We

know that we may increase the fat globules, or caseine, in our milk, by feeding for either. The wonderful record of that still more wonderful cow, making over thirty-six pounds of butter in seven days, shows what can be done by feeding for an object. An egg is simply so much albumen, oil, phosphorus, lime, soda, sulphur and iron, and if we want one and one-half ounces of this concentrated food daily, we must select the food that will produce it. The hopper will not carry, or the stones grind, unless the grist be furnished; and we must remember that we cannot "gather figs from thistles." If you will kill a pullet just as she comes to laying, and cut her open, you will find, at the mouth of the egg passage, an egg fully formed, to be laid during the next twenty-four hours. Just back of that, another with the shell forming, or with the outer membrane formed, and then others in different stages of development. Counting as many as the eye can detect, you find about four hundred, and then there appears to be a mass of membrane, which, under the microscope, reveals minute germs, infinitesimal yolks, to the number of about three hundred.

The germs of all the eggs the hen ever produces are formed before the first appears. Now if this is so, and there is no reason to doubt it, we see at a glance that we have but to feed egg-forming food, in order to hasten the growth and development of these germs. We can just as well have these eggs in two and a half years as to wait four or five, as many do. Good health with proper food will secure the steady production of eggs. Crowd into the machine, albumen, phosphorus, lime, soda, iron and sulphur, in the form of food, and the supply of eggs must be forthcoming. In this way are the records of two hundred and more annually made possible, and in this way, only, can we improve our flocks, and secure the greatest per cent of profit.

Wheat should form the staple article of food for laying hens; then oats, barley, buckwheat and corn. These, in the order given, I believe to be best suited to meet our wants. Corn has but a small per cent of egg-forming material. It supplies the fat in the yolk, and during the long, cold winter nights it is the only food to sustain the animal heat. Oats are valuable, but not so much so as wheat. Vegetables of all kinds, cooked, should be fed regularly. The aim must be to provide a variety, and thus maintain good health, without which productiveness is impossible.

The essentials for success in poultry breeding are pure air, fresh water, warm buildings—without artificial heat, sound grain, cleanliness and exercise.

Good ventilation must be provided, and the flocks protected from drafts of cold air. Fresh water is as necessary for the good health of fowl as for man. Warm buildings are essential, made so by the use of good material well put together, so that a moderately even temperature may be secured without resorting to artificial heat, which almost always brings disease, through weakened constitutions. Sound grain is absolutely necessary, both for health and productiveness. Damaged grain and sour meal have no more place in the poultry yard than musty hay and damaged corn in the barn. As soon expect from one, gilt-edged butter, as from the other, pure, fresh eggs. Cleanliness must be preserved in the poultry houses. "Eternal vigilance is the price of liberty" from the insects which otherwise would steal our profits. Our poultry houses, nests, roosts, roosting places and dust pens must be cleaned frequently, and by the use of whitewash and kerosene, kept free from vermin. I am attempting to show how a profit of two dollars a head can be made possible. That many realize much more there is no doubt, and I believe anyone, who desires, can realize these figures, but only by giving attention to the details here indicated. Having observed those thus far mentioned, we come to the last, and one of the most important, for without exercise, eggs will not be produced, and such as may appear will have no value for hatching.

We find here the cause of failure with so many flocks. Attention is given to everything else. An abundance of choice food is kept by them all of the time, but for want of exercise there are no eggs to cheer our longing eyes. Work is the order of our lives. By the sweat of our brow we earn our bread, and there is a two-fold blessing following. Not only the daily bread is forthcoming, but we maintain and preserve our health. Just so with our fowl. We want an egg daily, and we want that egg to be rich in substance and full of vitality, so that, if we so desire, a strong, healthy chick may be hatched. To secure this, we must keep up the health and vigor of our stock by work. The soft and cooked food must be given in clean dishes, and none left after the meal is eaten, but the whole grain should be scattered in the straw, or gravel, so that they will be obliged to search for it, a grain at a time.

In deciding the value of different breeds we should consider size, hardiness, productiveness and maturing qualities. There are increased advantages in breeding pure blood stock. Each breed has its own peculiar characteristics, and promiscuous crossing always results in failure.

It is not my province to discuss to-day the merits of any particular breed, but rather to suggest, if I may, how the greatest profit can be made possible with the flocks you now have. In breeding one variety we come, slowly and unconsciously, but none the less surely, to be more critical in our judgment, and to better appreciate and enjoy our work, while at the same time increasing the profits of the business. The "fancy breeder," so called, has gone before, and by years of study, application and expense, made straight the path by which you may walk to success.

The difference in the egg supply of the smaller and larger breeds must turn the scales one way, while the increased weight and value in the markets would operate the other way. For this reason I urge the importance of studying well your surroundings; decide what you will breed for, and then go to work, and year by year improve your stock through judicious matings. If you are already established in the business, I do not advise you to dispose of your present stock.

In every flock some are better layers, or have better form than others. Select these for your breeding stock, and with them mate a male bird bred from choice laying stock, and thus increase the size and productiveness of your flocks. Have an object in breeding poultry, labor to realize it, and success will crown your efforts. During the summer months colonize your fowl and chicks over the farm, and away from the buildings. This will necessitate a little extra labor, but it will give greater freedom from worms and insects on the farm where they are kept. Build small portable houses that two can carry, and move them weekly, thus providing fresh ground and also enriching the fields. Inexpensive buildings five feet wide, eight feet long, corner posts two feet high, a board at the top and bottom, and a square roof, gives the frame necessary. The timbers should not be larger than two by two. Clapboard the sides and roof, slat the ends with laths, and you have a coop that will house a dozen hens, or in which you can grow thirty chicks, and carry wherever you choose. Grow the chicks in the corn and potato fields, and there will be less trouble from cut worms and potato bugs. By distributing the poultry over the farm, the winter quarters can be thoroughly

cleansed and left vacant until cool weather, with the certainty that they are free from vermin.

In the hatching and raising of chicks, the question of profit or loss very largely depends upon the growth secured during the first month. Wanting only bone and muscle, fat-forming food has no place here, and for this reason I would not use corn meal. Hard boiled eggs and bread crumbs soaked in milk for the first few days after the chicks leave the shell, and then wheat coarsely ground and cooked with milk until crumbly, are the best food at this time.

Green food must be supplied, and this can most easily be obtained by sowing in shallow boxes oats or canary seed, and then placing in a warm, sunny place, and watering frequently. As they grow, they want animal food, and before they are old enough to make it safe to feed meal, we can grow, without expense, a plentiful supply of meal worms. Secure a few of these, and put them in a box with a few bits of rags or lint, sprinkle over them a little Indian or rye meal, moisten with sweetened water and place in a warm spot near the stove, and in a few days they will begin to multiply. In this way we may have a plentiful supply of animal food, with but little trouble and no expense. As the chicks grow, give as large a variety of food as possible, but feed only what is readily and promptly eaten. Feed frequently, and be sure that fresh water is always at hand to supply their wants.

When three months old, separate the cockerels from the pullets, and begin to feed them a small quantity of corn meal with their other food. In this way, force them as rapidly as possible, and secure the growth that otherwise would be lost. When fattening time comes, confine in small coops. To build a fattening coop, take slats and construct a coop twenty inches high, twenty deep—from front to back—and as long as you may wish. Raise it from floor so all the droppings will fall through where they can be daily removed. Now divide this coop with board partitions every seven inches, and you have spaces where a chick can stand or sit, but cannot turn around. A projecting shelf, where the food and water may be kept, is all that is necessary. Now we recognize the value of corn and corn meal, and these should be fed at least five times a day, cooking the meal thoroughly, but giving only what is readily eaten, and being sure that nothing is left to sour.

Ten days is as long as it will be profitable to confine chicks in this way, as after that time they will begin to grow poor; but, in that time, we may add from a pound to a pound and a half to the weight of each one.

What has been said in relation to the care and feeding of chicks, applies with equal force to turkeys. One of the chief causes of trouble in raising turkeys is the practice of feeding corn meal when first hatched. There is no reason why we should not export turkeys instead of being obliged to procure our own supply from other States.

To-day the price of poultry depends very much on its appearance when it reaches the market. If you will grow and ship a good article, uniform in quality, and packed in neat, attractive form, a good price can always be realized. In shipping eggs, select those uniform in size and, as far as possible, in color, pack in neat, attractive cases, giving special attention to cleanliness, and guaranteeing that every egg shall be fresh, and you will receive prices above market quotations from any reliable dealer.

Of the value of poultry dressing, I must speak, because it is so often neglected and lost. At one dollar and fifty cents per barrel, the price usually paid by farmers, it amounts to about forty-five cents per head. As this is one-half the expense of feeding, it is an item worthy our attention. In order to realize its value on the farm, it should be gathered daily, and placed in some receptacle where it can be well covered with some absorbent, either muck, plaster or road dirt. When wanted in the spring, remove to the barn floor, and, adding more of the absorbent, pulverize thoroughly. Scatter this in the drill, and you have a dressing as valuable as some of the commercial fertilizers sold in the market.

I am often met by the query, Suppose we all engage in the business, won't it be overdone? To-day it is almost the only business where the supply is not equal to the demand. Statistics show that over two hundred million dollars' worth of eggs are consumed annually in this country, of which New York takes over twenty millions. During the first two weeks of April, 1884, seventy-eight thousand six hundred and sixty-seven barrels of eggs were received in the markets of New York City. France and Germany supply us with almost seven millions' worth annually, while from Japan and Denmark large quantities are received. The importations from Canada are enormous, and of these no record is kept. During the past year we imported into the city of New York almost two million dozen of eggs.

In addition to these figures, which are surprising to all, is the fact that the home consumption is largely and rapidly increasing, so that the fear of over-production does not seem to be well founded.

If any one thinks of engaging in the business, I want to advise him, or her, to commence with small flocks. The successful breeding of poultry for eggs and the market is a trade to be learned by degrees, and experience is the best teacher. Begin with small flocks and grow into the business as you feel that you know your ground. Study well the details, and never forget that attention to these will settle the question of profit or loss. Remember this, that if you have a flock of one hundred and double it, you will quadruple your cares.

There is no branch of farm industry which will pay so large a percentage of profit as a well-regulated poultry yard. Any one who engages in it systematically can realize a net profit of two dollars per head. Five hundred hens, and the raising of one thousand chicks, annually, will demand the time of one person, but it will not only give a good support to a family, but do much towards enriching the farm. The field which this business opens for young people is one of its best features. Our young men and women have too often seen the hard side of life as they grew to manhood and womanhood, and are anxiously looking for the time when they will be free to leave the old life, which has been so full of drudgery, and go out into the world of trials and temptations, of which they know nothing. Unconsciously, too many fathers have made the farm life hard and uncomfortable, and the deserted homes all over our fair State tell a story from which we would gladly turn. If we can but interest the young people in some branch of farm industry, by commencing early and letting them have something of their own to do and to have, we shall forge chains that will hold them to the old farm, and chains that will be as easily worn as silken bands. Here is one grand opportunity, in poultry breeding, to interest and hold the young people; and as they engage in it they will find ample room for all the study and thought they can give, for in its various branches it brings us close to Nature's laws.

Poultry breeding for profit in Maine can become one of our leading and most profitable industries. Our rocky and worn-out farms can be made to blossom and fruit anew with fresh life, and out of it we all may reap a harvest of gain. Attention to details is the secret of success, and let us never forget that "trifles make perfection, and perfection is no trifle."

Institute at Exeter.

A second Institute for the county was held at Exeter, Nov. 7, by invitation of the West Penobscot Agricultural Society, whose exhibition grounds are in that town. The attendance was large. Entertainment was furnished by the ladies of the society.

The programme for the day was arranged for Dr. Twitchell to repeat his lecture on Poultry, in the forenoon. In the afternoon Hon. J. O. Adams gave a lecture on Rotation of Crops. In the evening Prof. Balentine gave a lecture on Milk and its Secretion. An exchange of courtesies closed a successful Institute.

MILK AND ITS SECRETION.

By PROF. WALTER BALENTINE, State College.

Milk is a liquid secreted by animals of the class mammalia for the nourishment of their young from birth through a period more or less extended. It consists of water, caseine, albumen, fat, sugar and ash, in proportions varying under normal conditions with different species of animals, with different individuals of the same species, and with the same animal at different stages in the period of lactation.

While this lecture is devoted chiefly to the milk of the cow, the mode of milk secretion in all mammals is so similar that it will have a general application, and illustration drawn from other sources will often serve a purpose here.

The position and outward appearance of the milk-secreting organs of the cow are so well known that any remarks in this direction would be superfluous. In order, however, to obtain a clear conception of some of the questions involved in milk production it will be necessary to give a description of the internal structure of the milk-secreting glands.

The udder of the cow is composed of four distinct glands, one for each teat. At the base of the teat is a reservoir, or milk cistern, of considerable size, which is connected with the external orifice of the teat. Leading out of the reservoir into the mass of the gland are the milk ducts, varying in number in the different quarters of the udder. These ducts divide into smaller ducts and these again into ductlets,

until their ramifications penetrate every part of the gland. The branching of the milk ducts resembles the branching of a tree. At intervals the ducts pass through reservoirs, varying in size, but much smaller than that at the base of the teat. According to Professor Arnold, at the points where the milk ducts connect with these reservoirs, are muscular fibres, which pass around the ducts in opposite directions, which finally connect with the muscles of the abdomen; thus enabling the cow to close the ducts by drawing up the abdomen.

The same authority suggests that this action results in stopping or diminishing the flow of the milk, and may occur through nervous excitement.

Clustering around and opening into the most minute of the milk ducts are little sacs or vesicles which are lined with epithelium cells. All modern authorities agree that these vesicles are the seat of the formation of the milk.

Figure I is an enlarged cut taken from Chauveau's Comparative Anatomy of the Domestic Animals, showing the gland vesicles with their excretory ducts. The size of these vesicles in the human subject, in full lactation, is said to be equal to a hole made in a sheet of paper by the point of a very fine pin. This interesting portion of the gland will be described more fully later on.

Enveloping the entire mass of connective tissue in which the milk cisterns, ducts and vesicles are situated, is a membrane, which is connected with the muscles of the abdomen on one side and the inside muscles of the thighs on the other. Partly within and partly without this membrane is deposited more or less fatty tissue, varying in quantity with different individuals, which makes the outward appearance of the udder a very deceptive guide for the determination of the development of the milk-secreting glands.

In addition, the udder is well supplied with nerves and blood vessels, whose capillaries carry the blood to the epithelium cells of the milk vesicles, and is, of course, covered like all other parts of the body with skin.

At puberty, and at the end of each period of gestation, the milk glands undergo remarkable modification in volume, in secretion and in the minute structure of the gland. New vesicles are developed and the epithelium changes its character. While milk is not being formed the vesicles are shrunken, and the epithelium cells have a granular appearance. At the end of gestation the vesicles enlarge, and the

epithelium cells assume a spherical form and become charged with fat globules. The period of lactation being finished, the glands take on their former character.

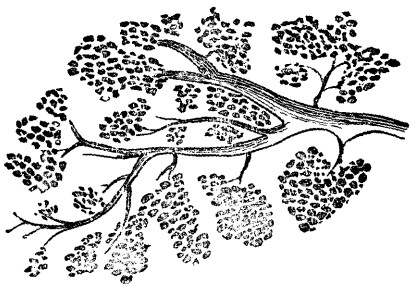
From time to time much has been written on the formation of milk globules, founded on the experiments and observations of different investigators. The views thus presented have been somewhat at variance. It is not my purpose to give these different views in detail, but to present the results of some recent microscopic observations of the vesicles and epithelium cells of the milk gland.

Figure II, copied from Dr. J. G. M'Kendrick's article on milk in the ninth edition of the Encyclopædia Britannica, shows a half diagrammatic view of a section through the mammary gland, magnified forty-five diameters; *a*, represents a duct divided into two branches; *b b b*, connective tissue surrounding and going between the vesicles of the gland, the dots representing the epithelium cells.

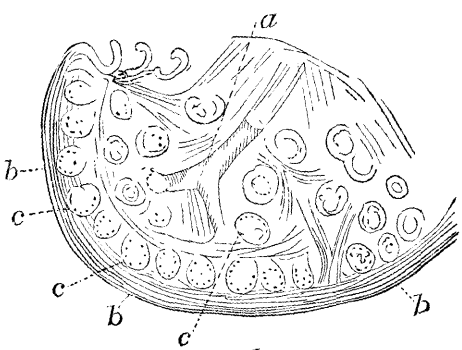
Figure III presents a portion of the same gland magnified about four hundred diameters, showing one complete and two incomplete vesicles; *a a a*, are epithelium cells lining the vesicles, each having a rounded protoplasmic nucleus; *b b b*, epithelium cells containing next the interior of the vesicle, a milk globule; *c c c c*, milk globules which have been set free from the epithelium cells.

The milk globules are formed in the protoplasm of the epithelium cells, and during lactation one or more globules may be seen in each cell. Even in the earliest stages of the formation of the milk globule it consists of a globule of fat, covered with an albuminous envelope. It is not known whether the epithelium cells break up and fall off after the formation of the milk globules, or whether they have the power of ejecting them and proceed to form new globules.

At or previous to the time of parturition, there is secreted by the mammary gland a yellowish viscid substance, having a higher specific gravity than the secretion of a later period, containing a larger quantity of solids, and remarkable for its large percentage of albumen and ash, and for its deficiency of milk sugar. This substance is known as colostrum or biestings. Viewed under the microscope, there are seen, in addition to the regular milk globules already referred to, clusters of milk globules adhering to each other, and a few irregular flakes, probably epithelium scales, and a small number of granular corpuscles. Figure IV shows the colostrum as seen through the microscope. The colostrum has a slight acid reaction, coagulates on boiling, and possesses purgative properties.



I.



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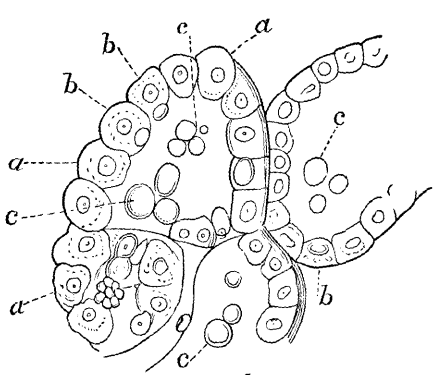

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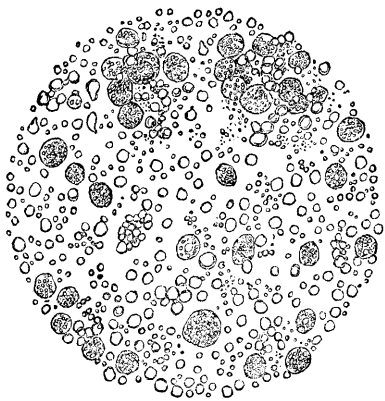

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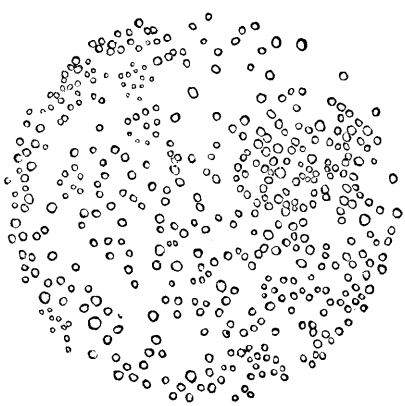

V.

While the colostrum is evidently designed to serve a purpose in the system of the young of the animals producing it, with some breeds of cattle instances frequently occur in which violent scouring has followed when the calf has been allowed to fill itself with the first secretions of the udder. This scouring is difficult to check and often results in the death of the calf.

The secretions of the mammary glands change rapidly after parturition, so that in the course of seven or eight days they take on their normal character.

The following six sets of analyses, by Dr. Friedr. Crusins, show the changes that take place in the composition of milk, from the time of calving through the first month of lactation.

Cow Number 1.

Time from Calving.	Dry Substance	Butter.	Sugar.	Albumen.	Caseine.	Salts.
Immediately after..	38.4 per ct	8.4 per ct.	0 per ct.	15.5 per ct.	11.2 per ct	3.3 per ct.
1 day after.....	30 1 "	5.9 "	0 2 "	13.7 "	10.3 per ct.	
2 days "	23.1 "	6.2 "	0.9 "	10.9 "	5.1 "	
3 " "	15.3 "	4.0 "	2.5 "	8 6 "	0.2 "	
4 " "	14.9 "	4.5 "	3.6 "	5.1 "	1.7 "	
5 " "	13.7 "	3 7 "	3.9 "	3 4 "	2.7 "	
6 " "	12.9 "	3.0 "	4.3 "	2.0 "	3.6 "	
7 " "	12.5 "	2.5 "	4.2 "	2 1 "	3.7 "	
8 " "	12.7 "	3.1 "	4 5 "	1.7 "	3.4 "	
14 " "	12.6 "	2.5 "	4.3 "	1 6 "	4 2 "	
21 " "	12.1 "	2.3 "	4.6 "	0 9 "	4.3 "	
28 " "	12.4 "	2 6 "	4.4 "	0.7 "	4.7 "	

Cow Number 2.

Time from Calving.	Dry Substance.	Butter.	Sugar.	Albumen.	Caseine.	Salts.
Immediately after..	15.9 per ct.	3.1 per ct.	0.5 per ct.	5.3 per ct.	7 0 per ct.	
1 day after.....	13.6 "	2 5 "	2.1 "	4.9 "	4.1 "	
2 days "	13.1 "	2.2 "	3.4 "	2.7 "	4.8 "	
3 " "	12.4 "	1.9 "	3.8 "	2.8 "	3.9 "	
4 " "	11.5 "	0.9 "	3.9 "	2.3 "	4.4 "	
5 " "	11.6 "	1 0 "	4.5 "	1.9 "	4.2 "	
6 " "	11.3 "	1.7 "	4 4 "	1.2 "	4.0 "	
7 " "	11.5 "	2.4 "	4.8 "	0.9 "	3.4 "	
8 " "	12.0 "	2.9 "	4.7 "	0 8 "	3.6 "	
16 " "	11.5 "	2.6 "	4.8 "	0.5 "	3.6 "	
21 " "	11.7 "	2.5 "	4.6 "	0.3 "	4.3 "	
30 " "	11.2 "	2.3 "	4.8 "	0.3 "	3.8 "	

Cow Number 3.

Time after Calving.	Dry Substance.	Butter.	Sugar.	Albumen.	Caseine.	Salts.
Immediately after..	21.0 per ct.	2.9 per ct	1.5 per ct.	6 8 per ct.	7 3 per ct.	2.5 per ct.
1 day after.... ...	15.9 "	2.1 "	3.0 "	4.3 "	6.5 per ct.	
2 days "	14.5 "	1.2 "	3.7 "	4.5 "	5.1 "	
3 " "	13 1 "	1.2 "	3.9 "	4.0 "	4.0 "	
4 " "	12.4 "	1.5 "	4.2 "	2 6 "	4.1 "	
5 " "	11.5 "	2.1 "	4.1 "	2.2 "	3.1 "	
6 " "	11.7 "	2.5 "	4 3 "	1.7 "	3.2 "	
13 " "	11.4 "	2 1 "	4.1 "	0.8 "	4 4 "	
26 " "	11.8 "	2.3 "	4.1 "	0.5 "	4.9 "	

Cow Number 4.

Time after Calving.	Dry Substance.	Butter.	Sugar.	Albumen.	Caseine.	Salts.
Immediately after..	16.7 per ct.	3.7 per ct.	2.3 per ct.	4.1 per ct.	6.6 per ct.	
1 day after.....	14.5 "	3.6 "	2.9 "	3.6 "	4.4 "	
2 days "	14.1 "	3.1 "	3.5 "	2.4 "	5.1 "	
3 " "	13 2 "	3 2 "	4.1 "	1.7 "	4.2 "	
4 " "	11.9 "	3 0 "	4.5 "	1.7 "	2.7 "	
5 " "	11 7 "	3.1 "	4.0 "	1.1 "	3.5 "	
6 " "	11.8 "	2.9 "	4.1 "	0.6 "	4.2 "	
20 " "	11.7 "	3.0 "	4 0 "	0.4 "	4.3 "	

Cow Number 5.

Time after Calving.	Dry Substance.	Butter.	Sugar.	Albumen.	Caseine.	Salts.
Immediately after..	14.2 per ct.	2.5 per ct.	2.9 per ct.	4.7 per ct.	4.1 per ct.	
1 day after.....	13.1 "	2.5 "	3.5 "	2.9 "	4.2 "	
2 days "	12 5 "	2 1 "	4.1 "	2.0 "	4.3 "	
3 " "	11.6 "	2.7 "	4.5 "	2.0 "	2.4 "	
4 " "	11.7 "	3.1 "	4.5 "	1.7 "	2.4 "	
5 " "	11.4 "	2.9 "	4.2 "	1.9 "	2.4 "	
6 " "	11.4 "	3.2 "	4.1 "	1.0 "	3.1 "	
8 " "	11.2 "	2.4 "	4.3 "	0.8 "	3.7 "	
15 " "	11.3 "	2.6 "	4.6 "	0.5 "	3.6 "	
21 " "	11.7 "	2.3 "	4.3 "	0 4 "	4.7 "	
29 " "	11.5 "	2.9 "	4.3 "	0.3 "	4.0 "	
35 " "	11.3 "	2.7 "	4.5 "	0.4 "	3.7 "	

Cow Number 6.

Time from Calving.	Dry Substance.	Butter.	Sugar.	Albumen.	Caseine.	Salts.
Immediately after..	22.5 per ct.	4.1 per ct.	1.7 per ct.	8.5 per ct.	8.2 per ct.	
1 day after.....	18.9 "	4.0 "	2.2 "	6.3 "	6.4 "	
2 days " morning	16.3 "	3.7 "	3.5 "	5.0 "	4 1 "	
2 " " evening	15.9 "	3.5 "	3.5 "	4.4 "	4.5 "	
3 " " morning	15.0 "	3.0 "	3.9 "	3.8 "	4 3 "	
3 " " evening	14.5 "	3.3 "	4.3 "	3.0 "	3 9 "	
4 " " morning	12.9 "	2.8 "	4.3 "	2.8 "	3.0 "	
4 " " evening	12.7 "	2.5 "	4.5 "	2.2 "	3.5 "	
5 " " morning	12.1 "	1.9 "	4.8 "	1.8 "	3 6 "	
5 " " evening	12.6 "	1.7 "	4.7 "	1.9 "	4.3 "	
6 " "	12.5 "	2.3 "	4.7 "	2.0 "	3.5 "	
7 " "	13 0 "	2.8 "	4·6 "	1.9 "	3 7 "	
14 " "	12.6 "	3.0 "	4.5 "	1.3 "	3 8 "	
21 " "	12.5 "	2.7 "	4.8 "	0.6 "	4.4 "	
28 " "	12.6 "	2 5 "	4.5 "	0.6 "	5.0 "	
35 " "	12.9 "	2 8 "	4.5 "	0.6 "	5.0 "	

True milk, as has already been stated, is composed of water, caseine, albumen, fat, sugar and ash, or salts. All of these substances are believed to be the product of the epithelium cells, which have been described. The caseine, albumen, sugar and ash are in solution in water; the fat is held emulsified in this solution and gives to milk its peculiar white color.

Figure V represents the fat globules of sound milk as seen under a microscope. The albuminous covering of the fat globules before alluded to is probably nothing more than caseine adhering to the globules from the solution in which they float.

I am aware that different views have been held in regard to this point, but the experiments of Martiny seem to show conclusively that this is the case. Martiny took 38.5 grammes of milk which had been thoroughly skimmed after standing forty-two hours, and which showed under the microscope only a few small milk globules, and heated it up to 33° Reaumur = 106° Fahrenheit, and added 1.8 grammes of melted butter. After shaking violently for some time at the same temperature and allowing to stand, no fat separated out. All the fat had been emulsified, and on examination with the microscope fat globules were found, differing in no way from the natural milk except in size. Those artificially produced were larger. On adding one grain of carbonate of sodium to the emulsion and allowing the mixture to stand forty-four hours, cream arose which could not be distinguished from natural cream.

The fat globules vary much in size. Prof. J. B. Simonds gives as an average diameter, $\frac{1}{4000}$ in., and records measurements as high as $\frac{1}{2000}$ in. in diameter. Prof. L. B. Arnold states that they range from $\frac{1}{1500}$ to $\frac{1}{4000}$ of an inch in diameter, while Dunglison gives the variation as from $\frac{1}{12700}$ to $\frac{1}{3040}$ of an inch in diameter. The specific gravity of the fat globules is less than that of the liquid in which they float, consequently they rise to the surface when the milk is allowed to stand for some time, and form what is known as cream, which differs from milk only in the larger quantity of fat it contains and the proportionately less quantity of the other milk constituents. The milk below the cream never becomes entirely free from fat globules under ordinary dairy treatment. The globules that remain in the skim-milk are usually much smaller than those that pass into the cream. The fat globules have the property of gathering together and forming masses of fat known as butter, when milk or cream is agitated for a time at a proper temperature. The temperatures between which it is possible to form butter by churning are 50° and 86° Fahrenheit. At a temperature below 50° the fat globules appear to be so hard as not to adhere to each other when they come in contact, and above 86° the fat globules are melted, and cannot be collected. The temperature at which the best results are obtained in collecting the fat globules into butter is in the vicinity of 60° F.

Churning at a temperature much below this, a portion of the fat is liable to be lost, while at a temperature above 65° the butter is soft and has mixed with it too much caseine, which it is difficult or impossible to separate by subsequent washing, and the butter is liable soon to become rancid.

Caseine is the white coagulum formed in milk when it sours, or on the addition of rennet, as in cheese making. The substance resembles lean meat closely in its elementary composition. As a nutrient it is classed among the flesh formers. Caseine is precipitated from its solution in milk by alcohol, mineral and organic acids, though it re-dissolves in an excess of acetic and tartaric acids. Caseine is insoluble in water, but freely soluble in solutions of the alkalies. Many chemists have looked upon the caseine held in solution in milk as chemically combined with alkalies, and have explained the action of acids in coagulating it, as the result of the acids forming a union with the alkali, and throwing the caseine out of combination. The action of rennet in precipitating caseine from milk, was attributed to the development of free lactic acid from the milk sugar.

Dr. Välcker and others have shown, however, that the caseine may be precipitated from milk that is still alkaline, and while the above explanation may be true so far as the action of acids is concerned, it does not explain everything in connection with rennet action. The caseine precipitated by the action of rennet seems to be different in some respects from that precipitated by acids. That obtained through the action of rennet does not dissolve in carbonates of the alkalies, while that obtained from the action of acids is freely soluble in the same. Caseine precipitated by means of acids is said to be nearly free from earthy phosphates, while that precipitated by the action of rennet contains these phosphates in comparatively large quantities.

Deschamps, as early as 1840, performed experiments which indicated that the active principle of rennet in coagulating milk is due to a peculiar ferment. His experiment consisted in treating a rennet with alcohol, by which he obtained a solution which acted on milk like ordinary rennet.

To this solution a slight excess of ammonia was added, which precipitated a substance that was insoluble in pure water. After thoroughly washing the precipitate it was dissolved in water, to which a little acid had been added. The solution thus formed was found to possess the power of coagulating milk the same as rennet. Other experiments by Deschamps at this time, and by Hallier and Martiny at a later period, support the view that the active principle of rennet is in a ferment.

The temperature most favorable to rapid coagulation of the caseine in milk by rennet seems to be between 90° and 100° F. At 140° coagulation is said not to take place, and at lower temperature than 90° it goes on more slowly.

When the caseine of whole milk is coagulated the fats are held mechanically in the curd, and there remain in solution in the whey the albumen, milk, sugar and salts. The fats seem to be necessary to the conversion of the curd into a good article of cheese.

Albumen may be separated from the whey by adding acid and boiling. The quantity of albumen contained in sound milk is small as compared with the other dry matter of the milk. It adds somewhat to the value of skim-milk and whey as a feed. In its chemical composition and reactions albumen is identical with the white of an egg.

Of the organic compounds contained in milk, there remains to be described milk sugar, or lactose. To this substance milk owes its sweet taste. It may be obtained from whey by evaporating nearly to dryness, when on cooling the sugar will crystallize out. By repeated crystallizations it may be obtained pure.

Although milk sugar has the same elementary composition as cane sugar, it differs from it radically in many of its properties. Milk sugar is less sweet than cane sugar, and does not undergo alcoholic fermentation on the addition of yeast. Milk sugar readily changes into lactic acid when its solutions are exposed to the air. This change is brought about by a ferment which is carried in the air. The acidity of sour milk is due to the conversion of milk sugar into lactic acid. Under certain conditions, in the presence of lactic acid, milk sugar is converted into a sugar capable of alcoholic fermentation.

In southern Russia, and other eastern countries, an alcoholic drink known as kumis is prepared from mare's milk by fermenting the milk sugar it contains. Milk sugar is prepared in large quantities in Switzerland, and is used chiefly for medicinal purposes. I am not aware that it has ever been prepared commercially in this country.

The ash of milk usually forms 0.95–0.97 per cent of the entire weight, and is composed chiefly of phosphates and chlorides of the alkalies and alkaline earth.

Rose found in 100 parts ash:—

Potash	23.49	Silicic acid	0.06
Soda	6.96	Sulphuric acid	0.05
Lime	17.34	Phosphoric acid	28.04
Magnesia	2.20	Chloride of Sodium	4.74
Iron oxide	0.47	" Potassium	14.18
Carbonic acid	2.50.		

From the time milk is drawn from the udder there is a tendency to decay, due to ferments which the milk contains in itself while still in the gland, or to those which are brought to it by the atmosphere. If these ferments are allowed to perform their work on the milk, it is soon spoiled for many useful purposes.

Many of the difficulties which the practical dairyman has to overcome before attaining success in his business are due to these milk parasites, and it is fortunate for him that few, if any, work at either low or high temperatures. If milk is cooled down below 50° F., or

lower, soon after it is drawn, and is kept at that temperature, these ferments either do not produce any changes in the milk, or the changes take place so slowly that in ordinary dairy operations they are of little account. On the other hand, if milk be brought up to the temperature of boiling water, these parasites are destroyed, and if it be sealed up while still hot may be kept for an indefinite period without suffering change; or if left exposed to the atmosphere after cooling, it is not likely to undergo other change than souring, within reasonable limits of time, and this change will be somewhat retarded by the operation. Noxious ferments are said to be introduced into milk through the use of improper food and water, which make the milk unfit for human consumption, independent of its keeping qualities. Given sound milk to start with, there is little trouble in placing that milk, or its products, on the market in good condition, providing that due care be given to cleanliness and control of temperature.

Milk has the property of absorbing various odors, which are liable to be carried over into the manufactured products and detract more or less from their value, according as they are offensive. Hence it becomes important not to allow milk to stand in any other than a pure atmosphere.

I once had the misfortune to spill a few drops of ether in a dairy room, in which the milk was set in open pans. The odor of the ether could be detected in every pan of milk at skimming time.

It has already been stated that the composition of milk varies with different species of animals, with different individuals of the same species, and at different periods during lactation for the same individual. Below are given actual analyses of milk from various domestic animals, which may be taken as representative.

	Cow's Milk.	Goat's Milk.	Sheep's Milk.	Mare's Milk.
Water	87.00 per ct.	87.30 per ct.	81.60 per ct.	91.37 per ct.
Fat	3.20 "	4.40 "	7.50 "	0.55 "
Caseine	3.00 "	3.50 "	4.00 "	0.78 "
Albumen	1 20 "	1.35 "	1.70 "	1.40 "
Sugar	4.30 "	3.10 "	4.30 "	5.50 "
Salts	0.70 "	0.35 "	0.90 "	0.40 "

Variations in the quality of the milk of different cows are known to every dairyman. It would seem unnecessary, therefore, to present facts on this point; but as these variations are much larger than is generally supposed, I give two analyses, which by no means present the widest differences of the analyses that have been made public.

	No. 1.	No. 2.
Water	84.2 per cent.	88.2 per cent.
Fat	6.7 "	2.1 "
Caseine	3.9 "	3.8 "
Albumen	———	0.8 "
Milk sugar	4.6 per cent.	4.1 "
Ash	0.6 "	0.6 "

From these analyses it is seen that the milk of one cow, while containing practically the same amount of caseine and milk sugar, carried over three times as much fat as the other.

Though the milk of a cow does not appear to undergo radical changes after the first eight or ten days after parturition, still the composition is not constant, as is shown by the following table of the dry matter and fat contained in the milk of a cow, whose milk was examined from time to time through a period of nine months, commencing two weeks after calving. These examinations were made by Brolyk of Amsterdam.

	Dry Substance.		Fat.	
	Morning.	Evening.	Morning.	Evening.
January 28	11.18 per cent.	11.40 per cent.	2.03 per cent.	2.29 per cent.
February 12	11.59 "	11.45 "	2.31 "	2.40 "
" 20	10.43 "	11.00 "	2.03 "	2.08 "
March 10	10.93 "	11.18 "	2.01 "	2 39 "
" 24	11.42 "	11.53 "	2.40 "	2.92 "
April 8	12.03 "	12.08 "	3.18 "	3.82 "
" 30	12.95 "	12.79 "	3.82 "	3.89 "
May 12	11.96 "	11.93 "	3.79 "	3.85 "
" 24	11.83 "	———	3.48 "	———
June 8	———	11.93 "	———	3.44 "
" 20	11.84 "	11 91 "	3.02 "	2.99 "
July 2	11.85 "	11.79 "	2.76 "	2.88 "
" 20	11.78 "	11.83 "	2.99 "	2.99 "
August 15	12.21 "	12.60 "	2.91 "	3.29 "
September 1	12 71 "	12.79 "	3.59 "	3.68 "
" 18	12.96 "	12.79 "	3.90 "	4.02 "
October 4	12 69 "	12.59 "	3 82 "	4.11 "
" 21	12.44 "	12.70 "	3.90 "	4.10 "

The variations shown in this table were doubtless in part due to feed. From January till May the cow was on winter feed and from May through October was in pasture. It appears, however, that while the animal was fed at the barn there was a gradual increase of solids in the milk and a corresponding increase of fat. When the animal commenced feeding on grass both dry substance and fat fell

off somewhat, after which there was a gradual increase in both solids and fat up to the end of the experiment, when they attained their maximum for the year.

Both quantity and quality of milk is determined, to a certain extent, by breeding. Those breeds of cattle that have been bred exclusively for the production of butter are noted for the richness of their milk in fat, while those that have been bred for large yields of milk, without regard to the quantity of butter it is capable of producing, give milk which usually contains a larger per cent of water. Those breeds kept exclusively for beef do not as a rule prove great milkers.

It was stated in the description of the mammary gland, that at the end of each gestation remarkable changes take place in the structure of the gland. Among the changes that take place at this time is an increase in the number of milk vesicles, which adds to the milk-producing power of the animal from year to year, until she passes the prime of life.

The following figures from the milk record of Regehly of Ludwigshof, Oberschlesien, shows the increase in the quantity of milk produced from year to year by the different members of his herd.

Age of Cow at Calving—Months.	Yield of Milk in Quarts.						
	1st year after Calving.	2d year from 1st Calf.	3d year from 1st Calf.	4th year from 1st Calf.	5th year from 1st Calf.	6th year from 1st Calf.	7th year from 1st Calf.
28	2700	2944	3400	3919	3796		
36	1830	2688	2464	3212			
37	2780	2752	2664	3842	3572		
35	2345	2138	2272	Sick	3234	2883	3360
22½	2695	2170	1632	2710	2336	3562	
15	1464	1885	2226	2229	2691	2847	3320
21¼	1608	1518	2204	2480			
21	2080	2480					
27	2432	2521					
19¾	1679	1795	2062	3075			
	Average.						
	2161.3	2306.9	2365.5	3066.8	3125.8	3030.6	3336.6

Höger of Melnik reports from his experience the following results for the milk obtained per centener (44.62 lbs.) of hay at different ages.

	Age in Years.	Pounds of Milk.	Per cent of highest yield.
After dropping first calf	3 to 4	35	62.2
" " second "	4 " 5	42½	75.5
" " third "	5 " 6	48¾	86.6
" " fourth "	6 " 7	51¼	91.1
" " fifth "	7 " 8	56¼	100.0
" " sixth "	8 " 9	45	80.0
" " seventh "	9 " 10	38¾	68.8
" " eighth "	10 " 11	33¾	60.0
" " ninth "	11 " 12	28¾	51.1
" " tenth "	12 " 13	25	44.4
" " eleventh "	13 " 14	21¼	37.7
" " twelfth "	14 " 15	17½	31.1
" " thirteenth "	15 " 16	13¾	24.4
" " fourteenth "	16 " 17	10	17.7

Nervous irritation effects both quantity and quality of milk. The popular conception in regard to the formation of milk appears to be that it is secreted constantly and that in this way the milk reservoirs of the glands are gradually filled and when this supply is exhausted no more is to be obtained for the time. This is doubtless true to a certain extent. Many animals, however, have no milk reservoirs, the lactiferous ducts being connected directly with the milk vesicles so that no considerable amount of milk can be carried ready formed. Such is the case in the human female; and the larger portion of the milk must be secreted while the child is at the breast.

Even with those animals which are supplied with milk reservoirs it is doubtful if the larger portion of milk drawn from the udder at one time is not formed during the process of milking.

For the purpose of throwing light on this point, Martiny undertook the following experiment:

A cow which was estimated to weigh about 600 lbs. was milked three times daily, at 5 A. M., at 1 P. M. and at 9 P. M. For the last ten days of the experiment she made the following record:

	Yield of Milk in Quarts.			
	Morning.	Noon.	Night.	Total.
1869—March 6	1½	1½	1½	4½
" 7	1½	1½	1¾	4⅝
" 8	1¾	1⅜	1¼	4⅜
" 9	1½	1½	1½	4½
" 10	1½	1½	1½	4½
" 11	1½	1½	1½	4½
" 12	1½	1½	1¾	4¾
" 13	1⅝	1	1½	4⅛
" 14	1½	1½	1½	4½
" 15	1¼	1⅜	1½	4⅛
" 16	1½			

On March 16 at 1 P. M. (the usual time of milking) the cow was slaughtered and the udder immediately cut off, and without loss of milk one-half was taken, from which the milk was expressed. In order to facilitate the flow of the milk from that portion of the udder treated, it was cut through and through in many places. The milk that was obtained by this treatment, together with a small amount of blood that was unavoidably mixed with it, measured one-fourth of a quart, which was about one-third of the amount usually obtained at that milking.

It appears from the experiment that a portion of the milk drawn from a cow's udder at the regular milking time is present in the reservoirs ready formed, but that the larger portion is secreted while the milk is being drawn. It is probable that the first portion may be drawn from the udder under any circumstances, but the last seems to be controlled largely by the nervous condition of the animal. It is a well-known fact that many cows fail to yield the usual amount of milk to a new milker. Many cows also shrink their milk on taking away the calf. Harsh treatment has a perceptible influence on the yield of milk.

While many authorities might be cited in support of the assertion that nervous irritation affects the quality of milk, I will only give a single case which came under my own observation. At the College there were some milk analyses being carried out in connection with feeding experiments. The milk of the experimental animals was examined daily. One animal, in particular, was noted for the uniformity of the fat content of her milk. One morning the fat fell off to less than half the normal quantity. On looking for a cause for so sudden a change in the quality of the milk, the cow was found to be in heat and extremely restless. Three weeks later she came in heat again, with like result as to the quality of the milk.

Extremes of temperature are unfavorable to the best results in milk production. The temperature of the body is maintained by, and the milk manufactured from, the food which the animal consumes. The lower the temperature of the atmosphere in which a cow is required to live, the more food will be required for maintaining the body temperature, and the less will be used for the production of milk. On this point little need be said. The majority of farmers in this State have learned by experience that exposure of their dairy animals to severe winter weather invariably causes a shrinkage in the milk. On the other hand, extreme high temperatures produce

feverishness, often resulting in diarrhœa, followed by a decreased flow of milk.

Of all the questions involved in milk production, none have a greater practical importance than that of feeding. Since milk is produced directly or indirectly from the food consumed, the quantity, and to some extent the quality, of the milk must be dependent on the quantity and quality of the food. No amount of fodder, however, can convert a poor milch cow into a good one, as the capacity of a cow is dependent on other considerations.

I do not propose to present the theory of cattle feeding in detail, as it has been ably and exhaustively treated in the Twenty-Fourth Annual Report of the Board. I will, however, take up some of the important facts and conclusions arrived at, bearing on the subject in hand.

There are contained in our feeding stuffs four classes of compounds, namely, albuminoids, carbohydrates, fats and mineral matter. In the animal there are albuminoids, fats and mineral matter. (Under the head albuminoids, for convenience are classed the gelatinous and horny matter, as they have practically the same chemical composition.) The albuminoids may be used for the production of fat, flesh or other nitrogenous substances, and in sustaining life. A certain amount must be used for the last purpose. Carbohydrates and fats may be used for the production of fat and in keeping up the animal heat. The mineral matter is not likely to be deficient in any of the common fodders, and may be left out of consideration.

Albuminoids are the most costly of the nutrients, and it is desirable to use as little of them as possible and attain the object for which we are feeding.

It will be noticed from the foregoing statements, that some of the functions which the albuminoids are capable of fulfilling, may also be performed by carbohydrates and fats. The object in compounding a ration for any purpose is to have such a relation exist between the albuminoids, carbohydrates and fats that the albuminoids shall be used only where they are necessary, and to have the remaining work performed by the cheaper nutrients.

German investigators have, as a result of their experimental work, found that to maintain an ox at rest in stall it requires a daily ration which contains in 17.5 lbs. dry matter, about 0.7 lbs. of digestible albuminoids, 8.0 lbs. digestible carbohydrates, and 0.15 lbs. fat, having a nutritive ratio of 1 : 12. This ration may be

looked upon as about what would be necessary to keep a cow of 1,000 lbs. weight, not in milk, in good condition without gain or loss of flesh. This ration might be called the food of support. When the animal is giving milk this ration could not be expected to support her without loss of weight. More food must be given; and a glance at what the food is required to do will give some idea of what the quality of the additional food must be.

The following shows the average composition of milk as given in the Farmer's Annual Hand Book:

Water,	87.5	
Fat,	3.5	
Caseine,	3.5	Albuminoids.
Albumen,	0.6	
Milk Sugar,	4.3	= Carbohydrates.

We have 4.3 parts carbohydrates, 3.5 parts of fat, to 4.1 parts albuminoids.

Some authorities have claimed that the carbohydrates and fats of milk come from the albuminoids of the food; others admit that the carbohydrates may come from the carbohydrates of the food but that the fat comes from the albuminoids, while still others deem it possible for a portion at least of the fat to come directly or indirectly from the carbohydrates. Whichever view of it is taken, the food that is given in addition to the food of support must be much richer in albuminoids in order to furnish the proper material for forming the constituents of the milk.

Practically the German experimenters have found the following ration to be economical, and while keeping up a good flow of milk, also maintains the animal in fair condition: 24 lbs. dry matter, containing 2.5 lbs. digestible albuminoids, 12.5 lbs. corbohydrates, 0.4 lbs. fat having a nutritive ratio of 1 : 5.4.

If from this ration we subtract the ration of support we have the extra food required for a cow giving a good flow of milk, which is 1.8 lbs. digestible albuminoids, 4.5 lbs. of carbohydrates and 0.2 lbs. fat, which gives a nutritive ratio of 1 : 2.7, which is very narrow, but about what we could expect from the work it is required to perform.

The effect of the composition or quality of the feed in milk production is well illustrated in an experiment carried out on the College Farm during the past year, the results of which were printed in the Report of the Board of Agriculture for 1883, which I reproduce here in slightly different form.

Cow Tinnie.

Periods of 21 days.	Daily Feed.	Digestible Nutrients—Pounds.			Nutritive Ratio.	Milk—Pounds.	Butter—Pounds.
		Albuminoids.	Carbohydrates.	Fat.			
First ...	20 lbs. hay, 5 lbs. wheat bran	1.49	10.63	0.37	1:7.8	316	28.4
Second ..	20 lbs. hay, 5 lbs. cotton seed meal	2.28	8.98	0.82	1:4.8	332	30.9
Third ..	20 lbs. hay, 5 lbs. corn meal.	1.13	11.61	0.43	1:11.1	293	20.2

Cow Betsy.

First....	20 lbs hay, 5 lbs. cotton seed meal	2.28	8.98	0.82	1:4.8	320	18 1
Second ..	20 lbs. hay, 5 lbs. corn meal.	1.13	11.61	0.43	1:11.1	243	15.3
Third ..	20 lbs. hay, 5 lbs. wheat bran ...	1.49	10.63	0.37	1:7.8	266	12.79

ANDROSCOGGIN COUNTY.

Institute at Turner.

The Institute for Androscoggin County was held at Turner Center Grange Hall, November 13. O. M. Tinkham of Vermont repeated his lecture on Butter Making as a Business, and the remaining time was taken up in discussion of the subject of the lecture. Mr. Nelson, the member of the Board for the county, opened the discussion.

Mr. Ham. We have had presented to us this afternoon the importance of certain points in handling the products of our cows, and among other things the importance of providing proper feed if we would secure the best product. There is a very important question that arises in the mind of every owner of cows: How shall I supply myself with the food best calculated to produce the best possible results? I suppose that almost every one concedes that grasses, properly cured, are the foundation of all good feed for producing milk. These may be supplemented with the grains and the different kinds of forage. But the grass crop is the one on which

we must mainly rely to support our stock. We find the grasses growing naturally, but it is within our power to improve them. While I agree with the sentiment advanced this afternoon in relation to the value of clover, still I am of the opinion that a mixture of the grasses is preferable to any one alone. I think we should bear that in mind when we cultivate for grass.

MR. LITCHFIELD of Winthrop. As Secretary of the Kennebec Grange I have had occasion to travel over that county somewhat, and I have managed to pick up in that way considerable information which I have found of benefit in my business.

I suppose Vermont is the leading State in the Union in the reputation of its dairy butter, and the gentleman from that State who has spoken to us this afternoon has given us some of the reasons for that. I am sorry to say that the impression has somehow got fixed in the minds of many Maine farmers that Maine is rather a poor place, and that Maine farmers cannot hope to compete with those in some other states. I believe that Maine is just as good a State as Vermont. I believe that Maine can produce just as good butter as Vermont. I believe we have just as good dairymen in Maine as they have in Vermont. True, Maine has never had in the markets any standing as a butter-producing State. Much of that article which Maine has sent to market has gone as Vermont butter. I know that previous to my engagement in the associated dairying business my butter went as Vermont butter. But our butter factories will work a change in this. We do not wish to travel in the rut that Vermont dairymen have traveled in so long and which they still persistently stick to. If, as the gentleman has said, Vermont has won her reputation by long practice of dairying, why may we not expect the same for Maine? But if we expect this we must be progressive farmers. As time goes on changes take place in the business of dairying as well as in other industries, and we as progressive men must examine these new ideas and see if they are applicable to our case, and see if there is anything in them to benefit us. We are conducting this business of dairying because we believe there is money in it. If we want to get the most possible money out of it we must be ready to adopt the improved methods.

After years of reflection and study I came to the conclusion that we must pursue, as husbandmen, some sort of stock husbandry in order to maintain the fertility of our farms. With that same view I entered, with others, into the establishment of a cheese factory,

and the result has confirmed my ideas. The increase of my stock increased the fertility of my farm, and increased the money that I have to handle. In the last year this idea of making butter by the associate system has taken hold upon the community in which I live, and we have had in operation there a butter factory. It is difficult to make some of the farmers understand the benefit of associated dairying, notwithstanding the exemplification it has had there in the cheese factory. I presume such is the fact in every place where a butter factory or a cheese factory is established. But as I look back through the years since the establishment of our cheese factory I can bring to mind many men who at first objected to the enterprise, but who have from time to time given up their prejudices and joined our ranks, until now we have the larger part engaged in the enterprise, and we have become so strong that we have this past year run both the cheese factory and a butter factory successfully and satisfactorily to those engaged in the enterprises.

One thing that has induced us to establish our butter factory is the fact that we have so increased the number of our cows that we cannot manipulate the milk at home without over-working the women, and we were obliged to establish the butter factory to get rid of handling our cream at home in the winter. By the establishment of the butter factory we have lightened the burdens of our women; we are saving the expense of marketing bulky products. But there is much yet to be learned. Such a scheme cannot be perfected in one or two years; but we are growing in the right direction. The butter factory is growing more popular among us.

Question. Do you have the same patrons for the butter factory that you have for the cheese factory?

MR. LITCHFIELD. Many of them.

Question. Would you advocate running the cheese factory in the warm season and then changing to the butter factory through the colder season?

MR. LITCHFIELD. I would not advocate that; I advocate the butter factory the year round.

Although we have been successful for ten years in the cheese factory and have this past year run the butter factory, there have been established within six miles of us, on three sides of us, three different cheese factories that have been run successfully for the past three years. Now I draw this inference from that—that the prosperity of the Winthrop farmers in patronizing the cheese and

butter factories, has developed an interest in the surrounding towns, and thus has not only been a benefit directly to us but also to them, and has increased the dairying interest in the county of Kennebec wonderfully.

Now I say we must pursue stock husbandry to maintain the fertility of our farms, and what better can be done than to keep a dairy stock? It seems to me that we ought to band together to increase this business just as far as is possible, until Maine shall gain such a standing in the market, as a butter-making State, that she can compete even with Vermont. I like this idea of trying to beat; I like to be on top always. Honest rivalry is a good thing and will help to build us up. It will keep us awake and on the alert to embrace new methods. I wish to say to the farmers of Turner that the farmers of Winthrop who have been engaged in the butter factory business are entirely satisfied. The idea is spreading all over the State that this business of associate dairying must be developed.

MR. TINKHAM of Vermont. In view of the very flattering remarks of the gentleman in regard to Vermont butter, I would like to say a few words concerning that, if I may be allowed. Our success in Vermont comes not so much from making so very superior butter, because that is not the fact. It is because we have kept right along in the same business for so long a time that we have gained a reputation in the market. I do not know of a person in Vermont that has taken up either of the three prominent agricultural industries of that State, dairying, sheep raising or horse raising, and followed it steadily for twenty-five years, that has not made money.

You are getting interested in dairying more than you have been previously. That will lead you to get better cows and take care of them better and feed them better; and with the benefits will come a train of attendant evils, because they say the gods never put all good things in one package, and when you get a great good you get a corresponding danger. You will find that will hold good with your cows, and I want to speak of that. One great danger is milk fever. We have lost a great deal of stock with that disease. It may occur within thirty-six hours after the cow drops her calf. The disease is really a clot of blood forming in the brain, and it sometimes will produce insanity; the cow will butt her head against a stone wall or anything. Sometimes there will be partial paralysis of the hind legs and she will stagger, the milk ceases to flow, and in less than forty-eight hours, ordinarily, unless relief is given, the cow is dead.

Let me tell you how to act in such cases. As soon as you see the first symptoms, place a cord around the neck and throw up an artery, give it a sharp tap, and let the blood run until you have caught half or two-thirds of a pailful, and it will astonish you to see how quickly they will recover. You see the theory. There is a pressure of blood diverted from the course it took before the calf was dropped, and that pressure of blood through the system forms a clot on the brain. You take away the blood and that relieves the pressure. Then you want to secure an increased circulation. Give the cow a pint of whiskey, after you have bled her, and not before. The quickened circulation through the brain will dissolve the clot. I know a man that gave two quarts of alcohol, reduced one-half, to a valuable cow who was absolutely down and so far gone that the owner had sent his man to dig a place to bury her. He bled her three-quarters of a pailful and then gave her this alcohol, and before night that cow was on her feet, feeding.

The difference between feeding a calf twice or three times a day is very small, but it is very often the difference between a live calf and a dead one. Do not make the changes from nature too rapidly or too thoroughly. If a calf has been sucking warm milk, a little at a time, at a temperature of ninety-eight degrees, from the cow, containing twenty per cent of fat, don't you see what a radical change you make at once if you feed that calf skim-milk at a temperature of fifty-six degrees? Make the change gradually. Put in a little skim-milk at first and then a little more, and keep the temperature up nearer to what the calf has been used to; if you can contrive a way to make the calf eat slowly, so much the better. I have mentioned perhaps the two most important difficulties that will be met as the breed of cows is improved. You have found that some cows are better than others for the purpose you want them. When you find a good one you will try to get her, and when you have a good cow you will naturally take good care of her.

SEC. GILBERT. I find that this matter of discussing the qualities of butter is a very delicate thing. People are sensitive; and the women, who have been making the butter in the past, are not the only sensitive ones. Butter factories are sensitive, and when their products go into the market they are a little reluctant to believe all they hear about it. One of the best things in the world for a dairyman is to see his product as others see it. Now whether you as dairymen, or you as factory operatives, believe that these fine points

which have been alluded to, in regard to butter in the market, are whims of the purchaser or whims of the market, it makes no difference. To the persons who hold those whims they are realities, and your butter, if sent to the market, goes into these hands and is subject to these whims, so you put yourselves in the place of catering to these whims whether you like it or not. It is no sort of use for you to set your butter up as the standard. They have the standard, and if your butter meets their standard it is all right; if it does not they don't care anything about it; there is butter enough somewhere else that does meet it. If there is anything that surprises me in investigating this matter of the standing of butter in the market, it is the quickness of the marketmen's perception of the different qualities of butter, and the accuracy with which the prices are graduated to correspond with those qualities. I think the gentleman from Vermont will agree with me, that the leading quality that goes to control the price in the market is flavor. Generally speaking, the most of the butter in the market looks pretty well. The principal part of it is pretty good texture, properly worked; but it does vary greatly in flavor. I have seen very striking illustrations of that recently; and I believe it would surprise you very much indeed, if you had the privilege, and the cultivated taste, to test the flavors of the different makes of factory butter in the State at the present time. Something is the cause of this, and what is it? You want to make good butter here; you want to make the best in the market; you want to beat our Winthrop friend. If you do it you have to look to this matter of flavors. Just consider for a moment what flavors are, and where they come from. In the first place the standard of flavor in butter is that flavor which it takes from good, sweet high land English grasses in the month of June. You introduce something of a different nature, whose flavors are directly opposed to that of the grasses, and you introduce a new element which is going to modify that flavor, and the market is going to object to it. You all know that I have always advocated cotton seed meal, and have been feeding it for years. I believe it will make more milk and more butter than any feed we can buy for the same money; but there is this fact that you and I and everybody else may accept as settled, and that is, that cotton seed meal, fed in considerable quantities, will give butter a peculiar flavor which is in opposition to this flavor which is obtained from the grasses. None of the fac-

tories in western Massachusetts or in the State of Connecticut allow cows to be fed cotton seed meal in any quantity.

While in Boston recently I went to visit those gentlemen who handle Maine factory butter, and I found butter from every factory in Maine excepting the Turner; and I want to say here that if you want to know what kind of butter you are making here in Turner go to Boston and find out. They know more about it there than you do, and they will tell you more than you know. They want to handle butter and they want to know where good butter is, and they want good butter sent them. They stated they had received consignments of butter from factories here in Maine that was as good as the best Iowa creamery, and when it was of that quality they were ready to pay as much money for it, and they would like to find a great deal more of the same kind. They are ready to admit that we can make as good butter here as is made elsewhere.

I questioned them very carefully in regard to the keeping qualities of the butter made by the deep-setting system. You know the impression has prevailed that butter made from cold setting would not keep. But they said that June butter made all right by the cold-setting system will keep well, but they claim that May butter will not keep. I do not know whether that is correct or not, but that is what they claim, and since they think so it is so. They are an authority unto themselves and we cannot help it.

AROOSTOOK COUNTY.

Institute at Easton.

The Institute for Aroostook County was held at Easton, November 19, by invitation of the Easton Grange. The attendance was large and the meeting successful in all respects. The Grange furnished entertainment to all in attendance.

The farmers of this town have been largely engaged in growing crops for sale, stock husbandry not having been developed to any extent. Much dependence has been placed on the potato crop. The loss by fire of their starch factory just as the season for manufacture had opened, together with the low prices prevailing for grain, had led them to question the propriety of a dependence upon this kind of farming, and to query in their own minds what should take the place of it.

Stock Husbandry was the general subject for the day, treated under the two heads—How to Get Good Stock, and How to Feed It. No report of this part of the work is given.

EVENING.

THE PRACTICAL EDUCATION NEEDED BY FARMERS.

By D. H. KNOWLTON, Farmington.

Half a century has wrought great changes in our country and State. Many of you here can recall the days when the spinning wheel and the loom were as common in the farmers' homes, as today are the cooking stove and the kerosene lamp. The rapid growth of our manufacturing industries, the extension of our railroads, and the immense development of our agriculture have completely revolutionized the farmers' homes in Maine. Let us for a moment look at the routine of a farmer's life fifty years ago. He kept a few sheep, for the family needed the wool for blankets and clothing, a cow or two to make enough butter to churn, a hog or two to keep the pork barrel filled, and a team to do necessary work. On his land he raised those things necessary for the food supply of his

stock and family. Few produced a surplus, for outside of the immediate limits of the cities there was little demand for farm produce. There was some call for beef cattle and the drover was a man well-known among Maine farmers, and each year drove from the State to the Boston markets a large number of cattle. In those days beyond the necessaries of life there was little incentive for the farmer to become a large producer, though then, as now, the farmer who best understood his business was the most prosperous, and accumulated the most wealth. Much more could be said descriptive of the farmer's life of fifty years ago, but it is sufficient for our purpose here to understand that as a rule all the farmer needed for himself and family the farm produced, that labor was of less value than now, that the vast prairies of the West were wild uncultivated tracts, and that so far as there was a market for farm produce it was effected only by the local supply from farms in the vicinity.

The situation is now entirely changed. The high price of labor and its inability to produce wearing apparel as cheaply as machinery skilfully operated, have driven the spinning wheel and looms of our grandmothers to the attics and back chambers. It will not pay to make our own blankets when the labor of making will bring us that which will be worth more. And so it is in all the articles of domestic use.

One of the largest railroads in the United States, according to its annual report, has carried freights the last year at the exceedingly low rate of one cent per ton for each mile of road over which the freight was drawn. At this rate a car load of corn or flour weighing ten tons from a point 1000 miles distant would cost for freight only $100, or on a single barrel of flour not far from $1.00. Thus it will be seen the entire world is now competing with the Maine farmer in the produce he offers from his farm. Different forces have been operating to bring about this result. It is enough for our present purpose to know that fifty years have wrought changes in this country of such a nature as to completely revolutionize our farming operations.

The situation calls for a wider education on the part of the farmer. The competition is so close that he must study the science of agriculture, the use of implements in the preparation of his soil, the value and influence of fertilizers in the production of his crops, and last but not least, he must study the condition of the markets, both present and prospective. Then, again, there is an unbounded

field for study and observation in the raising of different kinds of stock. The farmer who puts only his muscle into his various farming operations will be greatly surprised at the success of his better educated neighbor, who enjoys more of life's comforts, works less, but puts more dollars into his pockets. The one understands farming just as his father before him did. The other says: "My farming is a business; if it pays me it must be conducted as a business, and like all other kinds of business I must put my knowledge and my muscle into it. I must make a study of the business, and I know I will make it pay."

To meet this emergency which circumstances have thrust upon the farmer, there is a positive demand for a practical education. This education may not, probably will not, inform the farmer how to grow his crop, but as one of my college instructors very pertinently said in the class-room, "Your instruction here will give you the tools to work with in after life. If you make good use of them your training here will accomplish the object intended." The other day there came to my place of business a gentleman living in a small village where he manufactured, by turning from yellow birch, the blocks used for worsted spinning rolls. He told me how difficult it is to convince the English manufacturers of worsted goods in this country that there is any wood in the United States from which the blocks can be made. Little by little he is securing the introduction of American made rolls. He narrated many incidents of great interest concerning the turning of the blocks, the prejudice against them, and their slow but sure introduction. During the interview I said to him, "Now, sir, when you get home, sit down and put into writing just what you have told me and I will publish it and send it to New Orleans with your exhibit for the World's Exposition." "Ah," said he, "I only had a poor common school education and I can't do it. I can hardly write at all and I don't know how to spell." He did send me something, however, after further persuasion, but when I came to read it I was satisfied he told me the truth. Think you the common school gave him what it ought? We will not say where the fault is. During the present year it has been my privilege, if you will pardon the allusion, to serve my Grange as its lecturer. Up to this point I have been able to secure only two productions in writing from any of its members, and one of them had to be nearly rewritten by the sister who read it in public. Again, it is with the utmost difficulty that I can get any one to take any part in the Grange

exercises. The brothers and sisters say they can't talk, and as for writing they could not think of it, and I know lots of other lecturers have a similar experience. In the professions and in business circles there is usually no lack of ability both to speak and to write. Why shouldn't the farmer have the same power? Are his talents less, or is his education defective? We do not recognize the former, but we do believe the latter, and we regret to note that altogether too many of the farmers' boys and girls are but little better educated than their fathers in this respect.

It frequently happens that measures of great importance to agriculture are pending. The farmers' interests are at stake. Who are there among them who can champion their cause? When business interests are involved there is no lack of speakers or writers, but when the farmers are called upon to defend their rights with tongue and pen they are obliged altogether too often to invoke the aid of their natural enemies, the lawyers, or their cause goes by default.

Suggested by the above we come to an unfortunate defect in our common schools—the failure to teach its pupils to speak correctly in public and private, and to readily put their thoughts into writing. The old lyceum was a great help in both, but even here there were comparatively few who joined in conducting the lyceum, and the larger part of the boys and girls only went for the good time. The Grange is doing an excellent work for the farmers in the same direction, but alas! most farmers are not patrons, and consequently do not share the benefits of the great educational work the order is doing in Maine. In most of the country schools, so far as we know, very little is done to help the boys and girls speak correctly and freely in the class or before the school. Is it too much for us to ask of the public schools which cost us so much, that they shall do more, yea, so much more as shall give the farmers' boys and girls sufficient confidence to enable them in private and public to correctly speak their thoughts, and in time of need defend their rights?

There were many good things in the country schools in earlier days. Modern education, we fear, has not improved some of them. The three R's formed the warp and woof of the whole instruction of the school. Every day, once, and sometimes twice, the old legendary goose quill and pewter inkstand came out from under the desk, and all the school wrote. There was not much science in teaching the various curves and slants, but somehow I know many of the old

folks learned to write a remarkably good hand. To-day, be it said to our shame, there is not as much time given to this important study as formerly, and according to our way of thinking, much of the science of writing is misapplied, in the failure to apply the principles taught. The instruction should go so far as to aid the pupil both in writing a legible hand and in expressing correctly his thoughts in writing. Can we ask less of our public schools than to teach how to speak and write correctly?

Of other defects in the course of study followed in most of our ungraded or country schools, we will say little at this time, though we are thoroughly convinced that more attention should be devoted to reading, and less to the unimportant parts of English grammar and mathematics. Of other matters which ought to be taught in the public schools, as forming a very important part of a farmer's education, we will speak later.

On every hand the farmer is surrounded by objects of interest. The forests are clothed with foliage, the hillsides and meadows are carpeted with the green grass. Earth, air and water are animate with living creatures. Nature's laws, many of them simple of comprehension, some of them hardly interpreted by our wisest men, are in full operation all around the farmer. Go where he may there is some law of Nature, which, if he understands correctly, will be of service to him, besides affording him the pleasure of a closer friendship with Nature herself. Did you ever see a child who did not love the delicate violet as it opens its beautiful petals in grateful recognition of returning spring? How the little ones will chase through the woods and over the hills in search of other flowers as they appear. Ah! these little ones of ours are much nearer to Nature's heart than many of us suppose! This love is natural to the child, and we should take advantage of this love to give the child a knowledge of the flowers he picks, how they grow, what they produce, and from these still further extend the instruction to other plants and flowers. By this study he is entertained, and little by little learns the habits, parts and uses of plants growing around him. Thus he learns, and in after years when he goes into the field the growing grain peeps up through the soil to greet him, the grass waves in token of his labor, and the golden ears of corn pay their tribute to his skill. Such are Nature's noblemen, for in recognition of such knowledge the earth yields bountiful harvests and unmeas-

ured pleasure. This study would give us a knowledge of how plants grow, and consequently what makes them grow. This incidentally leads to the study of fertilizers, the influence of tillage, and everything that makes the plant grow. Fruit and flower culture, which afford pleasure and profit alike to men, women and children, naturally follow. In my opinion both should be enjoyed by every farmer in Maine, and in every school-room the boys and girls should be taught the great lessons Nature reveals in plants, flowers and fruit.

Well-informed physicians tell us that sickness and death are frequently due to ignorance of physiology and hygiene. There is, strange as it may seem, a notable lack in the study of these important subjects in the schools of this State. Every boy and girl ought to be taught, both at home and in the school, that they are "fearfully and wonderfully made." The great principles of physiology should be clearly set before the pupil. So far as possible he should be taught human anatomy, and the functions of the various organs in the human system. Then still further, the pupils should be taught to care for themselves properly, that disease may be averted as far as possible, and that the suffering of friends may be alleviated by intelligent treatment from the hands of loved ones. A few well-taught lessons in the public schools upon these important topics would prove of inestimable service in the preservation of health and the management of the household. Nor would we have these lessons in physiology and hygiene end here, for on the farm there are the herds and flocks, from which to a large extent come the profits of the farmer's labor. The physiological study of our domestic animals points out implements, so to speak, with which growth and profit are secured. The nature of each animal being well understood, the object to be accomplished by feeding and care becomes one of the most fascinating of all the employments with which we are familiar. A clear, well-defined idea of the great object to be accomplished by stock keeping, enables the farmer to feed his stock with the most economical results. Think you then I am in fault when I urge that a study of such vast economic importance should have more conspicuous attention in our schools? No class of people have more at stake in this failure or neglect on the part of the schools than the farmers.

In my own county, a few weeks since, one of its most important officers was stricken down by disease, and, after a few days of in-

tense suffering, died, leaving a widow and child without means of support. It was a sad case indeed, but during his two years' service his wife had been his assistant, in fact, did a large part of the work required in the office. As a matter of justice a large number of our people petitioned to his Honor the Governor to appoint the widow to succeed her husband as Register of Deeds. "The lords of creation," however, threw up their heads and declared that a woman was not eligible under the laws of the State. For one, I propose to do all in my power to have the next legislature of the State remove the disability, for there is no position too remunerative or too exalted in this broad land of ours, or that is too good for any woman who may be competent to discharge the duties of the office. The farmers' wives in Maine have as much ability by nature as their husbands, but how many of them are there who are sufficiently educated in business matters to succeed them in the administration of the farm and the care of the family? And yet, thousands of women in the course of events are left to mourn the loss of husbands, and are called without any business training to the charge of large estates. At every corner a lawyer has to be consulted, and in the absence of some business education the families are often called to suffer from inefficient business management, occasioned by the fact that little heed is given to teaching in our schools the elements of a business education to boys and girls alike. Like Satan of old "going to and fro in the earth, and walking up and down in it," are thousands of tramps seeking opportunity to swindle people out of their hard-earned money. On every hand we meet them, and in every guise imaginable. Sometimes they offer the farmer new fruit trees of superior quality, sometimes a recipe for making home-made fertilizers, sometimes, alas, they sell the farmer a patent right or induce him to invest his money in some wild-cat scheme. Think you in these emergencies the farmer and his sons, yea, his wife and daughters, do not need a business education that will intuitively point these dangerous tramps to the door, and bid them leave the premises?

The school should be conducted as a business, to begin with; the teacher should have correct business ideas, and the course of instruction should embody so much of arithmetic, writing, book-keeping and other subjects as shall enable the pupil to gain the elements of a correct business education. Our schools cost us so much that we have a right to ask it, but at the same time we must not for-

get that we are asking more of our schools than has been required in the past. So that to meet our business wants we must not hesitate to modify our school system, to add to it new features, to strike out the useless. This may make the schools cost more, but if the times demand that our sons and daughters need more education to profitably conduct their affairs, like true men and women, as I believe you to be, let the expense be cheerfully borne. And yet, there is even now great extravagance in our present school system. So far as the cost by taxation is concerned there is an equality, but in the matter of advantages there is great inequality. Can any of you tell me why the country schools are shorter than the village schools? Last year the average length of the ungraded schools in Maine was sixteen weeks, while the graded schools were thirty weeks, a difference largely in favor of the graded schools. The farmer often pays a higher tax than his more highly favored townsman who lives in or near the village, while in return he gets much less for it. Strange as it may seem, up to the present time only a score or so of towns have been willing to abandon the old system. The town system, when adopted, invariably gives larger and more efficient schools with no greater expenditure of money, and certainly so far as the educational interests of the farmer are affected, his vote should be in favor of that system which will give his sons and his daughters just as many educational advantages as are enjoyed by those who are permitted to dwell in the villages. In justice to himself, the farmer can not longer afford to have his children suffer from the inequalities of the present school system.

I should be remiss if I failed still further to impress upon you the important fact that at best an education only gives a man or woman the foundation upon which to build solid and successful careers. The best practical education begins at home, and is watched over by the child's parents. At the home it should be continued, though the school in the use of text-books may take the lead later, but the great educational centre of the family should be the home. This leads me to the consideration of the means of giving our education all the fullness and practicality possible. The great sources of education after the elements are obtained are two, namely, books and one's own experience. The former contain in permanent form the best thought of past ages, the facts learned by experience, and thousands of theories which, one by one, like other "well-planned schemes of men and mice," have come to naught. Books—and here

let me say I do not believe in book-farming, except so far as the same is based on the actual experience of men who have tilled the soil themselves—contain the experience of other men, so that if we choose to avail ourselves of what other men have wrought, the opportunity is ours. Life at best is short, and to make the most of it we must take the experience of others. It is a very singular fact that many men are so constituted as to be unwilling to learn from the experience of others. It somehow seems necessary for them to travel over the same journey before the experience is accepted. The journey is made, however, at an unnecessary expenditure of time and means. And here, if you will allow me, I cannot refrain from alluding to our Normal schools, whose special mission is the preparation of their pupils to teach in the public schools of the State. So well established are the most important principles of teaching, that in these schools in a comparatively short time one may receive such instruction as will place at his service the experience of thousands in the school-room. It would take years for a young man to learn from his own experience as a teacher, that which a few months' training in these State schools makes clear as the light of day. And yet, there are those who question the usefulness of our Normal schools!

I associate with books the newspaper and magazine, though unfortunately the use of both are somewhat perverted, because many of us, in spite of convictions to the contrary, will insist on reading very much they contain which had better be left unread. In some communities farmers are jealous of one another, and in some school districts I know of there is a continual broil over some nonsensical cause or other. Thanks to the Grange, its influence is fast obliterating many of these social evils among the farmers, and bringing them together by the strong fraternal ties of the order. In the Grange there is opportunity of acquiring great practical knowledge. Experience in raising crops, in feeding stock, and other farm matters, are freely discussed, and the farmer goes to his home from every well-conducted Grange meeting a better informed man. Our business farmer is a man who has little leisure for talking politics or bottoming chairs at the grocery store, and yet he will make such a division of his time as to allow opportunity for work, time for reading what others are doing, time to attend the Grange meeting, and time to make out and examine his accounts at least once a year. There is too much work and too little rest for many farmers and

their wives. Remember the words of the wise man: "To every thing there is a season, and a time to every purpose under the heavens." Now that we have all the world to compete with we must allow time for study as well as for other things, else our educated farmers, and their number is increasing every year, will be far more prosperous than we. Do we want to know more about fertilizers? In a single volume, Dr. Harris, in his "Talks on Manures," tells the whole thing. Do we want to know what fruit trees to plant and how to care for them? Mr. Barry, in his "Fruit Garden," gives the information. Do we want to know how to make the most money from our stock? Stewart's "Feeding Animals" tells us the relative values of different foods and how to combine them so as to produce the most economical results, whether we want milk, butter, cheese, beef or stock. And so I might enumerate others. Magazines and papers will do much toward educating the farmer, but his knowledge would be defective without the reading of books. And while the farmer reads, himself, and studies his books, he must not forget his wife and the other members of his family. They, too, must have books and papers. They, too, should have some opportunity for reading and for recreation. When the Maine farmer reduces his operations to business principles, works his head as well as his muscles, teaches his boys and girls to do the same, surrounds his family with all the refining influences of books and culture, we may expect to find more boys ready to succeed their fathers on the farm. Maine is justly proud of the men she has sent to other States, and when her farmer's sons are taught to apply business principles to the farm, relieved of unnecessary drudgery and toil, then shall it be said his sons and daughters have the happiest homes in the land, and that they themselves are the truest, noblest types of the prosperous American farmer.

PISCATAQUIS COUNTY.

Institute at South Dover.

The Institute for Piscataquis County was held at South Dover Grange Hall, December 11. The travelling proved bad, yet there was a good attendance. Entertainment was furnished to all present.

The forenoon was devoted to the subject of Sheep Husbandry of Piscataquis County, and was opened by the Secretary of the Board. The ground was maintained that in times of low prices and consequent small profits, the true course is to keep only the best, and give them the best possible care. Only in this way can they be made to return a reasonable income. At other times common flocks may bring good returns, but now only the best were good enough. This position was further supported by the leading sheep growers present. Sheep husbandry is a large interest in this county, and the subject proved a profitable one.

How the Profits of the Dairy may be Increased, was the subject of the afternoon, considered by way of discussion by C. H. Cobb and Francis Barnes, on behalf of the Board.

In the evening Francis Barnes gave a lecture on the subject, A Plea for a Maine Home.

SOMERSET COUNTY.

Institute at Skowhegan.

An Institute for Somerset County was held at Skowhegan, December 30, with the following programme:

Forenoon, Creameries and their Work, by the Secretary of the Board, followed by discussion.

Afternoon, Maine Grasses, by Prof. C. H. Fernald of the State College; Poultry and its Profits, by Dr. G. M. Twitchell.

Evening, lecture by Francis Barnes, A Plea for a Maine Home.

The paper on Maine Grasses will be found in another place in this report. The other subjects are not reported. The meeting was successful in all respects.

OXFORD COUNTY.

Institute at Norway.

An Institute for Oxford County was held at Norway Grange Hall, January 1, 1885. In the forenoon Prof. Fernald repeated his lecture on Maine Grasses. A discussion followed the lecture, some extracts of which are here given.

DISCUSSION.

KENTUCKY BLUE-GRASS—WHITE-TOP. (*See Plates.*)

The subject of grasses being under discussion,

SEC. GILBERT said:

This blue-grass more than any other has been the means of making Kentucky celebrated as a stock-raising and a stock-breeding region. The supposition has been entertained by those who do not know anything about it that it would prove of equal value in other sections if introduced. Here is a great error. It is found scattered through grass fields all over the State of Maine, yet it is of

comparatively little value. I was very glad to hear the point brought out in regard to the destruction caused by insects, because I have seen that illustrated so many times. [See lecture.]

This grass does not appear very abundantly in our fields. In reseeding we have to wait a year or two until the clover and Timothy are reduced, when this grass appears from the seed that is in the soil. It is the first grass that heads in our fields and along our roadsides in the summer season, usually appearing the last week in June. Before the Timothy head makes its appearance, before the Red-Top head appears at all, you will see this grass here and there sending up its shoots and throwing out its branching top. This never thickens up to make a heavy growth in the fields. If we should depend upon it we should find a very light crop indeed, and a thin grass for pasturage. It comes too early for the other grasses. If it stands until Timothy matures and is ready to cut it has already passed its best stage. We need not place much dependence upon it as an economic grass here in the State of Maine. While it has a measure of value in pasturage, it has but little in field culture.

Question. Does the insect prey upon it in Kentucky?

MR. FERNALD. It does not attack it in Kentucky; the insect is not known there. It is known in New York State and I presume in Massachusetts, but I never have heard it reported from Kentucky.

SEC. GILBERT. I want to say one word in regard to one other grass, what is known as White-Top, a grass which comes into our pastures after they have passed through a measure of exhaustion, and into our old mowing-fields after Timothy and clover refuse to grow, and gives us, in the absence of something better, a limited quantity of valuable grass forage, provided we cut it at the right time. The spikes are thrown up very quickly. Go on to a field where the principal grass is of this kind the first week in July and you will think there is to be nothing on that field. Go out there the next week and there is quite a crop of this White-Top. That grass cut then, or fed then, is one of our most nutritious grasses. In a single week it will have passed its prime and you have, instead, a fodder that is almost worthless. The latter part of the season, cattle, sheep and horses absolutely refuse to touch it until they are driven by starvation itself to resort to it. It has an economic value, however, and it comes chiefly from the fact that it comes into a place which would otherwise not be filled. Timothy can find its natural

nourishment in a soil to a certain extent and for a given time, and will thrive and flourish and send up its good crop; after having fed upon that soil a certain time, that fails to grow, and this grass we are speaking of finds its natural food there, and goes on and makes its crop after the clover and Timothy die out from starvation; thus it comes in play, in our pasturage especially, but it is when nothing else will grow. This is better than nothing, because it gives a sweet, nutritious food for a limited time.

A. W. CHEEVER of Massachusetts. I would like to say a word in favor of the blue-grass that has been referred to here. I do not quite agree that it is not worthy of cultivation in New England in certain localities. I was in Kentucky last June, right in the height of the season to see Kentucky blue-grass in its best, and in all the region that I traveled through I did not see one acre of blue-grass that was as stout or as valuable per acre as I have grown in Massachusetts. I had two acres of swamp land that was reclaimed for the purpose of growing English grass; I could cut three crops a year from it by using the right varieties; it was sown to Orchard grass and June grass, both ripening at the same time. The Orchard grass grows about as tall as Timothy, and the June grass grows about as tall as ordinary Red-Top. The difficulty with Kentucky blue-grass is that it does not come to maturity and get into business until the second or third year after seeding. By that time the land is exhausted, and that is the reason blue-grass does not make much of a crop; but, sown with Orchard grass, by the second year the June grass will be in operation, and I never have seen grass of any kind produce much more heavily than that will under proper treatment, yet I do not recommend it for a general crop for the country as a meadow grass. It wants a peculiar location that is just adapted to it. It is particularly valuable to grow with Orchard grass that ripens at the same time, and is capable, under proper treatment, in proper places, of making as heavy a crop in Massachusetts, and I believe in Maine, as Red-Top, and as it can in Kentucky.

AFTERNOON.

CATTLE HUSBANDRY IN NEW ENGLAND.

By A. W. Cheever, Dedham, Mass.

Mr. President and Ladies and Gentlemen:

In responding to the call of your Secretary to take part in the discussion of the subject of Cattle Husbandry in Northern New England, I would not be so unwise as to attempt to prove that this industry is neglected above all others, nor that every farmer who is now doing something else well, and successfully, should make any radical change in his methods of farming. It is not well for all to follow the same business, and in no part of the world are the industries of the people more diversified than in New England, and nowhere else do the working classes secure more of the conveniences and luxuries of life. As a place to build a home, whether as a mechanic or farmer, I believe there is no section that holds out greater inducements to a young man than New England. If we sometimes become discouraged by our short crops and partial failures, we must remember that disappointment is at times the lot of all. Life in this world is a constant "struggle for existence," and he who works most persistently and hopefully is the one to be found at the front in the acquisition of the comforts and luxuries of life. As New England farmers, we have been too easily disheartened by the apparent or reported success of other classes, and of farmers in other sections. I have had the pleasure during the past summer of spending several weeks with farmers at the South and West who are occupying lands that are claimed to be the best that can be found anywhere in the world, but in no section have I found greater crops, better farming or more comfortable homes than can be found here in New England. There is much good land at the West, and in the South, but there is also much that is not good. So, too, there is good land and poor land here in New England.

Our land should, and it often does, pay bettter for the working than do lands in other sections, because of our near and excellent markets, and, because of these near and excellent markets, even our poorer soils may be made to pay as well for their cultivation as do many of the richer lands of other sections. Much of the infe-

rior land here in New England is inferior at the present time, not so much because it is naturally so, as because of long-continued neglect, or abuse, and if we would more generally adopt the better methods which many of our best and most successful farmers are adopting for the improvement of such lands, we would find that even these can be made to pay a good profit for working.

I expect that I visited, in Kentucky, some of the best farms in that renowned "blue-grass" region. I certainly saw as good farms as man ever need ask for, but wherever I saw a farm that looked thrifty,—a farm where the fences were kept up, the bushes and briars kept down, where the grass in the pastures was "up to the eyes" of the sleek, half-surfeited Shorthorns that languidly cropped a mouthful here and a mouthful there, or lay chewing the cud in the shade of the noble Black Walnut or Tulip trees, there I was also sure to find a comparatively good farmer. I say comparatively good, because better than the majority of their neighbors, for I saw no farming anywhere in the State, and but little anywhere in the West or in the South, that would equal in either gross or net receipts per acre what some of our best farmers in New England obtain from theirs. Nor would I know where in all New England to look for more unpromising lands than were some that I saw, even in the blue-grass region of Kentucky, lands that were once fertile and productive, but now considered almost ruined by bad farming.

It is true that there is a difference in the natural fertility of different soils, as well as a difference in their power to recuperate after being reduced by over-cropping or other bad management. The lime-stone soils decompose and become plant food more readily than do the granite soils under the action of the weather, but if we would plough and cultivate our granite soils a great deal oftener than we do, they would become fertile much faster. We have been merely cropping our lands too long already, and it is time that we begin *real farming*, honestly and earnestly. Many seem to think that the climate of New England is a formidable barrier to successful farming. It is true we can find sections three or four degrees south of us, where the winters are shorter and the summers longer, so that little provision is required for feeding animals in stables, but the very fact that cattle and horses can generally take care of themselves in mild climates, without special care, relieves man, in a great measure, from the very stimulus needed to make him thrifty and enterprising. It does not seem to be man's nature to do very much

for himself beyond what his wants compel him to do. The farmers of the mild climate and fertile, virgin soils of the South and West are not half so hard to compete with as they would be if they retained the thrift and enterprise for which we in New England are not unjustly proud.

It is the competition from active, enterprising men everywhere rather than from good land that we need to fear. There is no section of the country that can long hold a monopoly in the production of any of the great staple crops of the country. Every new country pays for a while, as a part of the price of its clearing and settlement, the spontaneous products of its soil. The farmers of the West are only doing now what the farmers of the East were doing a generation or two ago. Eastern gatherers of the soil's natural or original fertility reached the end of their rope some years ago. The West is rapidly pushing on towards the end of her's. Fifty years ago the eastern States fed their own people, including those engaged in manufacturing and other industries. Now the West is not only feeding a large portion of our people but has undertaken to feed the world, and some appear to think that she can do it; but the time is coming, and coming rapidly, too, when the West will find it no small matter to feed her own teeming millions. Chicago is already the third city in the Union in the value and extent of her manufactures, while many other western cities are rapidly increasing in the extent of their manufacturing industries. This all means a better home market for their crops and consequently a better market here for ours. Many eastern farmers imagine that the low rates for transportation, over the through lines between Chicago and the great cities of the East, are all in the interests of the producers of the West, but this is a great mistake. The western farmer has often high local freights to pay before he gets his crops into the Chicago depots, and this, too, after hauling long distances, by teams, over worse roads than the present generation of eastern farmers have any practical knowledge of. If we, here in the East, will but use the opportunities that the railroads throw in our way, the advantages from low rates of transportation will be found to be quite as favorable to us as they are to the average producer of the West. It is our own aches that we feel, and the great mistake of the New England farmer is in believing that the farmers of the West are so favorably situated that they are going to ruin him. The law of compensations governs and balances things so nicely in

this world that it is impossible to have all the good get into one place. Western men of intelligence see this, and honest ones are free to admit it.

A western farmer of large experience and observation, on a recent visit East, voluntarily told us that there is not nearly so much difference in the capacity of the two sections to produce as the majority of eastern men think there is. He said that what the East most needs is, more cattle, and more cultivation of the soil. Every observing eastern farmer must admit the truth of the statement. While on my visit to Kentucky I made the acquaintance of a cattle dealer, who, though a native of the blue-grass region, and of course naturally prejudiced in favor of his own State, had travelled somewhat in New England and was honest enough to acknowledge merit wherever he found it. He said that Kentucky by right could claim some of the best land, the finest horses, the thriftiest steers, and the prettiest girls in the world; but not all the lands, nor all the horses were notably superior, for he had found just as good soil in New England, as at home, and if all the horses in a given section in Kentucky were compared with all the horses in another given section in New England, it would be found that the average horse of New England is superior to the average horse of Kentucky.

It is not the average land of the West, nor the average success of the farmers who work it, that the discontented eastern man hears of. It would be difficult to find less productive land anywhere than some that I saw in the famous blue-grass region of Kentucky, and made so wholly by bad farming. We are apt to think of the soil of the West as being all prairie—deep, rich, level, and in fertility perfectly inexhaustible—for that is the way we have heard it talked about by interested parties who have had land to sell, or who wished to borrow money on western land securities. To get extra good land at the West, selections must be made as everywhere else, and when choice lots, or choice locations are found, they must be paid for accordingly, at the West as elsewhere. A great deal of western land needs draining before it can be relied upon to produce crops uniformly at a profit. In the older sections there is a great deal that is so far from level that it is already very badly washed and gullied under cultivation. Perhaps there is no more reliable source of information as to what the East and the West are actually doing than the returns of the United States census.

According to the report for the year 1880, the average yield of barley in all the States and territories, dropping fractions, was 22 bushels per acre. Only a single New England State fell below that amount, and all but one other State went above; the average for the six States being 24 bushels per acre. The yield in Maine was 22 bushels, in New Hampshire 23, Vermont 25, Massachusetts 27, Rhode Island 24, and Connecticut 21 bushels. The average yield of buckwheat for the whole country was 14 bushels per acre. Only two New England States produced less than the average. Maine raised 19 bushels, New Hampshire 20, Vermont 20, Massachusetts 14, Rhode Island 10 and Connecticut 12 bushels, the average for the six States being 16 bushels. The average yield of rye was 11 bushels. Maine grew 13 bushels per acre, Connecticut 12, Massachusetts 10, and each of the other three States 11 bushels, making the average for the six the same as for the whole country.

In the production of the more important cereals, wheat, oats, and Indian corn, New England did even better. The average yield of wheat for the whole country was 13 bushels per acre. Not a single New England State raised so little. Maine's yield was 15 bushels, New Hampshire's 15, Vermont's 16, Massachusetts had also 16, Rhode Island 14, while Connecticut, with her 19 bushels, was only excelled by Colorado with her 22 bushels. Wyoming Territory, Indiana and Michigan were the only States that equalled Connecticut in her wheat yield. The average yield for New England was 16 bushels, and this was exceeded by only nine States and territories in the Union.

The average yield of oats in the United States is put down in the 1880 census returns at 25 bushels per acre. Maine raised 29, New Hampshire 34, Vermont 37, Massachusetts 32, Rhode Island 29 and Connecticut 28 bushels, the average for New England being 31 bushels per acre, or 25 per cent above the average for the United States. Indian corn averaged the same year, throughout the Union, 28 bushels per acre. Maine produced 32 bushels, New Hampshire 37, Vermont 36, Massachusetts 32, Rhode Island 31, and Connecticut 32 bushels per acre, the average for the six States being 33 bushels, or 18 per cent above the average for all the States. Surely, with such figures as these to fall back upon, it will not do to say that New England soils are barren or unproductive. But this is not all. Every 100 pounds of this grain grown here in New England is at all times worth from 30 cents to 60 cents more than

in the cities of the West, while the difference is still greater between its worth in our own cribs and in the cribs of the western grower.

It will not be my purpose at this time to try to convince every New England farmer that he should endeavor to raise all the grain he uses. On the contrary, I would prefer to show that we can afford to buy grain to feed out upon our farms, for the double purpose of making a profit on the feeding, and for improving the condition of our farms. We have learned to use commercial fertilizers for the purpose of quickly bringing up worn-out lands into a productive and profitable condition. An honest fertilizer, judiciously bought, will enable one having land, but neither stock nor food for feeding stock, to immediately and profitably grow something upon his land that in the future will enable him to feed whatever stock he may choose to keep.

Fertilizers make an excellent reserve force to be drawn upon like money in a bank, at will, but the time has not yet come when the owner of ordinary farm lands can afford to adopt the use of them, to the *exclusion* of animal manures. Nor can the ordinary farmer, living at a distance from large cities, afford to supply himself with animal manures by any other means than by keeping animals on his farm. Purchased manures call for cash that ought to go to swell the profits of the farm, while manures made from cattle kept *on* the farm, may, to a considerable extent, if not entirely, accrue as waste material over and above the regular income from the business.

In Southern New England cattle husbandry at the present time is largely confined to the production of milk for the village and city markets. Many complain of low prices and small profits, but the time for making very large percentages of profit from the sale of milk for large cities is passed. There are too many who can see no way so easy of obtaining fertilizers for keeping up the productiveness of their farms and thus enabling them to support their families by their business.

Then there are others who contend that the price of milk at the farms is high enough, that if it were much higher so many more would embark in the business that the market would soon be flooded, and prices go lower still. I recently visited a milk producer who is milking sixty cows. The price of milk in his locality, delivered on board the cars, is thirty-two cents per can of eight and one-half quarts, but in order to make the sale *sure* and have no surplus milk

left over, or returned to the farm, a contract is made with the dealer at two cents per can *less* than the ruling price. The aim of this man has not been to compel buyers to pay higher prices, nor to make the poorest quality of milk that the dealers could be induced to take, but to make a first-class article, such as the buyer would be always glad to get, and then to make it so cheaply that it could be sold with profit at prices which consumers would be willing to pay. His farm is located in the vicinity of Boston, where good upland hay seldom sells for less than $20 per ton, but so near a railroad that grain can be secured without great expense for cartage from the station. He feeds grain freely, coarse fodder, such as swale hay and corn fodder, moderately, and good English hay sparingly. The average daily cost of grain this winter is 18 cents per cow, the fodder is reckoned at eight cents, and the labor of tending the cows at seven and a half cents per head. This gives a cost of 33½ cents per day, and a profit of about five cents, the milk yield averaging eleven quarts per cow. With a milk yield that pays all the expenses, the manure becomes wholly profit. It will be seen, however, that if his milk should happen to cost him only a half cent more per quart, that the manure would be the only source of profit; also, if the average daily yield should run down to nine and a half quarts.

As the figures now stand, this profit of five cents per cow per day brings in a profit of between sixteen and seventeen dollars per cow, or over a thousand dollars a year. No one can call this an extravagant income per cow, and yet on a dairy of fifty or a hundred cows it is a sum that few farmers would despise.

The cows are nearly all purchased from the dairy farmers up here in Northern New England, and are kept in milk as long as they will yield a profit on liberal feeding. It is rare that a cow is allowed to go dry, or to have a calf after coming into this herd. And this is only a sample of the practice of many hundreds of milk-producing farmers in the vicinity of the large milk markets in Southern New England and New York City. And here comes in a call for a division of labor among farmers. The milk producers cannot, as a rule, afford to raise their own stock. They have neither feed nor room to spare, nor the time to devote to fussing with young calves.

Occasionally milkmen do raise calves, but it is usually done under a sort of protest, for they all feel that you up here in Northern New

England can do that part cheaper than they can. About the only inducement the milk producer can have to raise his own cows is the hope that he will get a better class of cows than he can readily buy. But this ought not to be the case. You can keep just as good a breed of cows and raise just as good calves up here in Northern New England as can be raised anywhere, and with a reasonable profit too. Nearly all of us make the mistake of keeping our stock too long. Meat producers are finding out that young animals pay a much better return for the food consumed than do animals that have come to maturity. It may seem almost wicked to fatten and slaughter a five or a six-year-old cow, one that is apparently right in her prime, but if the combined business of raising, milking and fatting will pay better than the milking alone, and especially if there is another heifer always ready to take the place of the cow sold, it will not be very hard for a shrewd man to rid himself of any surplus sentiment in the matter. The *wicked* thing is to kill young calves before they have had time to yield us the profit they are capable of yielding. As a rule butter makers should raise all their promising heifer calves, and no cows should be kept but such as may be expected to bring good calves suitable to raise. There is a great and growing demand for good milch cows for supplying the milk trade of the cities, and men are scouring the country in search of them, but there are very few farmers who are *making a business* of meeting this demand. The milkman's cow ought to weigh, when fattened, about seven hundred pounds, dressed weight; she should give good milk, and not less than ten to twelve quarts per day for a year or more when farrow and well fed.

Such cows will bring fifty dollars apiece, or more, in the vicinity of Boston market, at all times, and there is profit in raising them at that price, if every detail is properly attended to. And there is a profit in milking such cows a year and then selling to the butcher, so there is profit all the way along, a good deal more than there is in keeping and fattening old cows that have passed their prime. It is one of the lessons that farmers have been learning of late, that animals of all kinds pay much better returns for the food consumed while they are young and growing than after they reach maturity. We all understand the wisdom of the old man who told his son to always buy *young* cattle in preference to old ones, because, if he happened to get cheated by paying too much, the young ones would "grow to it." Experiments in feeding, carried on at our experi-

ment stations, and at the agricultural colleges, and by private citizens, both in this country and in Europe, already too numerous to quote in detail, all point in one direction, and that in favor of young animals for feeding at a profit. In feeding for beef the practice of carrying cattle along from year to year, after they have arrived at maturity, for no other purpose than to pile on masses of solid tallow that will be eaten by nobody, is rapidly passing away, as is also the giving of premiums at fairs for such masses of superfluous grease. Quality and symmetry are turning the tables against mere weight and size, and plump young animals of moderate size, that have made an uninterrupted daily gain of good firm flesh, are the ones that are found to best suit the market and best pay the feeder. Cases are becoming common where heifers and steer calves are found to have made a greater growth during their first year than they could be made to take on in any subsequent year.

It is against our best interests, then, to "deacon" so many of our young calves, or to turn them off at four or five weeks old, after feeding them wholly upon new milk.

In estimating the profits of stock feeding, as in estimating the profits of other branches of farming, we often make a very wrong use of figures. It is true, as often said, that figures never lie, when they are properly placed, but misplaced they may deceive us most woefully. A young man of my acquaintance was recently complaining that his farm was not paying him anything. He had worked hard making and peddling milk and raising garden vegetables. He had increased the number of his cows, had purchased a new carriage, repaired some of his buildings, and put on additions to others; had paid all his bills as they came due, and had somewhat reduced the debt on his farm. In discussing the matter, he claimed that he had worked hard all the year and yet had nothing to show for it, simply because, at the time, he had no very considerable amount of unexpended cash in his pocket. Another farmer made quite a sensation a few years ago by publishing a book in which he attempted to show that all farming in New England is unprofitable, and that the chief aim and end of our agricultural societies and boards of agriculture is to deceive the poor, simple-minded farmers and keep them digging away, raising food at a loss to feed manufacturers and merchants who are shrewd enough to keep their own hands soft and clean, while enjoying the fruits of the farmer's hard toil. He gave us long tables of figures, which seemed to show that every calf, pig

and chicken, every acre of corn, wheat and potatoes, costs for labor and other expenses more than it will sell for in the market. And all this in the face of the fact that farmers, besides getting a good living, do, above almost all other classes, pay dollar for dollar on their debts and have something left besides.

Another case may not be without interest in this connection. An old farmer in Maine, feeling that he was drawing near the end of his earthly days, called in a neighbor to write his will. After the writing was finished, the neighbor, finding the old gentleman had been more successful in his accumulations than was generally supposed, asked him if he would tell him how he had contrived to acquire so handsome a property with no other resource than his farm for doing it. The old man replied that he couldn't himself account for his savings unless it was by raising steers, keeping them till they became oxen, and then selling them at a loss, for certainly the greater part of his money had been received from the sale of oxen, and they rarely brought what they seemed to have cost him. Now the trouble is, that what our cattle and our crops sometimes *seem* to cost is not exactly what they *do* cost. The truthful figures do not all get placed where they belong. We have all seen a great many statements, published in agricultural papers and reports, of crops grown in competition for prizes, and the systems of book-keeping followed by contestants have been almost as numerous as the parties competing. It is true that in farm book-keeping estimates must be resorted to to some extent, particularly in making out the inventories at the beginning and end of the year, but if the farmer finds that he has actually more stock and more cash at the end of the year than at the beginning, and has contracted no debts in the mean time, he will not feel very blue even if his imperfectly-kept books should make it appear that he had lost money by his farming. The milk producer, whose accounts I have already alluded to, reckoned his hay that he fed to his cows at the market price for such hay in his own neighborhood, the best of it at $20 per ton. But he tells me that the actual cost is much below that figure, for he grows it wholly with manure that is clearly a waste product from his milk business, which itself pays a profit. He manures so highly that he cuts three tons of hay to the acre at the first cutting, and with his own teams and regular farm help can put it into the barn, well cured, at an actual cost for labor of only two dollars per ton.

The cost of a ton of hay grown on a farm where only home-made manures are used, and where these will maintain the fertility of the soil, is just what the labor costs for hauling out the manure, and cutting and hauling in the hay, with the addition of taxes and interest. If a farmer, by raising and selling steers or heifers, or by making butter or cheese, can turn his forage crops into cash at his own door at market rates, save the expense of delivery, and then in addition have all the manure made from those crops left on his farm, for keeping up its fertility, he is certainly doing a business that ought to satisfy him, for he is "eating his cake and having it too."

Now, for me to say that I believe that raising heifers and steers, and making butter and cheese, can be carried on here in New England at a good profit is, I think, stating it very mildly, for the experience of thousands of enterprising and intelligent farmers all through these States affords unmistakable evidence of the truth of such a statement.

Some farmers are doing well buying thin oxen at low prices, feeding them a year, and working them at the same time, and then turning them for beef at a high price. Their gains are from three sources, work, added weight, and increased value per pound. One farmer writes me that the gain on a yoke of thin oxen in a single year was $100, and that on a four-ox team used three years, but renewed by exchanges of beef for fresh workers as often as a yoke became fat, he had made a gain of $700, with two pairs of cattle still on hand. But these figures hardly represent the legitimate profits of beef making in New England, for there is an element of speculation involved. Our friend may have been a shrewd buyer, and the farmers from whom the thin cattle were purchased may have sold them for less than they were worth. It is certain that in some cases the thin cattle had cost somebody more than they brought. But the same party who made a success at feeding lean oxen is also a successful grower of young stock. Here is what he writes concerning some calves that were raised by hand and fed upon skimmed milk: "We fed a grade Shorthorn heifer until she was nine months old, lacking two days, when she was sold for slaughter. Her live weight was 930 pounds, and she dressed 700 pounds. She brought six cents per pound, live weight,—$55.80. We also fed a grade Shorthorn steer until it was a year old, lacking one day. Its live weight was 1200 pounds, and it dressed 900 pounds and sold at ten cents a

pound, dressed weight, bringing $90." To show that the feeder has pretty thoroughly learned his business, I will quote further what is said about the care these calves received: "These animals were very quiet, good feeders. They were given all we thought they could digest and assimilate, that the greatest amount of flesh might be produced from a given amount of food. But one attempting to secure these maximum results will find there is great danger of over-feeding. The animal should be watched at every meal to see with what avidity the food is taken, and it should be watched after eating to see if there be any sign of indigestion, such as bloating. It might be very slight, yet enough to be noticed by one who is in constant attendance. The first symptom of over-feeding should be followed by reduced rations, less even than the animal might have digested if it had not been over-fed. The excretions should also be watched, and a frequent use of the scales will be necessary, as a serious injury would result from so long a continuance of over-feeding as to be manifest by a refusal to eat anything, or at most but little. The heifer mentioned was fed the best we knew how, largely upon skimmed milk and green corn-stalks grown at, perhaps, 15 tons per acre. The stalks were very sweet and were relished better than any other forage, and were given in connection with some wheat bran. The amount given of any of these foods would furnish no data from which to learn how much another animal might be fed, though it were of the same size. She was offered no more food than she would take at every meal, yet the scales showed that she would lessen her growth by over-eating. There was sometimes no other evidence than that given by the scales to show that she had eaten too much."

Another example of rapid growth in a young animal is that of a calf fed by Mr. Henry Lane of Cornwall, Vt., the account of which was published in the agricultural report of that State in the year 1882. The calf was dropped April 5, and weighed at birth 119 pounds. It was fed new milk three days, than fed on milk set 24 hours and then skimmed. The second week a little oil meal and wheat middlings were added. During the second month one pint of oil meal, one-half pint of wheat middlings and one gill of corn meal were added to the milk. The meal was scalded with one quart of hot water twelve hours before feeding. The meal was increased as the calf would take it, and the milk also, until a common-sized pailful was fed at each meal. The other food was grass in summer

and good hay in winter. The calf was weighed each month for a year, and the monthly increase recorded. The first month it was 82 lbs.; the second, 88; the third, 91; fourth, 94; fifth, 97; sixth, 101; seventh, 103 lbs. After this there was a gradual falling off in the monthly growth. The eighth month the gain was 96 lbs.; the ninth, 89 lbs.; the tenth, 82; eleventh, 75; and the twelfth month it was only 72 lbs., ten pounds less than the first month. The calf then weighed 1189 pounds. Had it gained 25 pounds more the increase would have been three pounds per day for the entire year.

The reports of the gain in weight of the prize winners exhibited at the recent Fat-Stock Show in Chicago all go to prove that the greatest gain, and consequently the greatest profit, comes from feeding young animals. Clarence Kirklevington, the winner of the sweepstakes prize for best animal of any age or breed, was at the show as a prize winner for the third time. In 1882 he was 645 days old, and had made a daily gain from birth of 2.35 pounds per day. The next year he gained but 1.16 lbs. per day and the last year only .97 lbs. The other prize animals exhibited showed a similar gain according to age. The greatest gain per day was made by a steer that was 683 days old; the next greatest by one that was only 350 days old, and the next was only 302 days old, the youngest animal shown, and making a gain of 2.52 lbs. per day from birth.

The *National Live Stock Journal* of Chicago, discussing recently this question of the comparative profits to be derived from feeding old or young animals, had the following:

"The average farmer puts unlimited confidence in his own practice, but always doubts theories not founded on experience. Now, this average farmer believes in the old-style slow way of maturing a steer at four years old, and he does not believe that it costs less to grow a steer of 1,200 to 1,400 lbs. in two years than in four. Well, this fat-stock show is held yearly to show this farmer that he is wrong in his opinion on this matter, and he is urgently invited to come and see fat animals of different ages and weights. He will see they gain more per day the first year than the second, more the second than the third, and when he reflects he will know that these animals must have eaten more the second year than the first, and more the third than the second, while the gain is exactly reversed. Besides, under the head of "Cost of Production," he will find animals exhibited of different ages, and these animals must bring a

history with them, showing their gain at the several periods of their growth, and also a report of the amount of food consumed, and its cost. This gives the whole matter in a form that cannot be mistaken, and with these it can be seen just what it costs to put on a pound gain in the different periods—that is, during the first year, during the second year, and during the third year. This was very clearly illustrated in the show of 1882. Nine animals, at the end of the first twelve months, weighed, on an average, 906 lbs. each, and cost 3.4 cents per pound. Five of these same animals gained the second twelve months an average of 566 lbs. each, at an average cost of 8 cents per pound. Two of the same gained during the third twelve months, each 650 lbs. at a cost of 12.54 cents per pound. This illustrates the extra cost, as the animal grows older, in a most convincing way. It will be seen that it costs more than twice as much to feed these steers the second year as the first, and more than three times as much the third year as the first, but they gained 350 lbs. more the first than the second or third years."

But not all animals, nor all breeds of animals, will give such results as these that I have described. If we are going into competition with the West in feeding cattle, we must select, as they do, the best breeds for the purpose. It is not necessary that our cattle be all pure blood, but it *is* necessary that they have good blood. I would not even appear to think lightly or to speak disparagingly of the Jersey cow, for she is the best cow in the world for those who like her best. But I cannot yet believe that the Jersey is to become the cow of America, nor the cow of New England, unless the habits and tastes of our people are to become greatly changed, for, under our artificial methods of feeding and forcing, we need a cow that, if she loses a teat, or becomes barren, will be worth feeding for beef. At present, and for a long time to come, the farmers of these northern New England States will find they have a good field open in supplying the constant demand from the milk-producing districts for large, mature cows that will yield a generous flow of good milk and be able to put on flesh at the same time. With well-selected cows, adapted to the production of both milk and beef, and kept for three or four years in butter dairies, where the skimmed milk is fed to calves, both heifers and steers, I believe that the hog can be largely dispensed with on our New England farms, and that the change will be profitable as well as agreeable.

I was once one of the number who believed that Indian corn could no longer be raised here in New England at a satisfactory profit. But that was when it was our custom to do nearly all the work by slow hand processes. Since we have learned to use the same labor-saving implements for its culture that the western farmers use, we find that the corn crop is one that the stock farmer cannot well afford to abandon. I once thought, too, that corn grown specially for fodder was preferable to that grown for both grain and fodder, but after learning by experience that an acre of corn can be made to produce nearly as much fodder with the grain as without it, I was converted to a change in practice in this regard. I am now fully convinced that Indian corn and grass grown in rotation and to be fed out upon the farm to good young dairy and beef stock, are crops that should take the lead upon a very large majority of our New England farms. We have made a mistake in trying to farm without stock. It will do for a while to raise hay and potatoes to sell from the farm, but no farm will stand that treatment long and remain fertile enough to yield an income that ought to satisfy a farmer with modern ideas of what constitutes a good business or even a good living.

One of the weak points in New England agriculture has been the comparative idleness of so many farmers and farm laborers during the long winters. We have required too large a share of our summer's income to carry us through the unproductive season of the year. With more stock to tend there would be more to do in winter, and the help could be employed the whole year through, much to the advantage of both employer and employe. But let us not forget that no animal can pay a profit on the food consumed unless that animal is kept in a constantly thriving condition. We must, therefore, not only feed well but we must also give our animals warm, comfortable quarters. In short, to make stock farming a success, we must put work into it, and make it a business. Those who have adopted such a course are making a success, and there is plenty of room for others. The market for stock and stock products is very large and is growing larger every year. The outlook, therefore, for the active and intelligent New England stock farmer, I believe, was never better than it is to-day.

DISCUSSION.

Question. Mr. Chairman, did I understand you to say that Mr. Cheever kept an animal to an acre of land? Some of the farmers would like to know what his mode of procedure is.

Mr. CHEEVER. My farm was a farm of one hundred and fifty acres on the tax book; fifty acres of it used to be cultivated, but I was satisfied years ago that that was too much of farm for my capacity, and I turned out about one-half of it into pasture, and that gradually came into wood, until the actual cultivated land was reduced to twenty-six acres. That land my father and myself attempted to put into good condition, as good as we knew how by such means as we could command without going outside, without going to the bank, but hiring a man to help us, clearing the rocks out, digging drains, getting the land into good condition by regular farm labor. While there were fifty acres under cultivation, in rotation, going over the whole occasionally, planting about three acres of potatoes and corn, getting around in about from ten to twenty years over it, we were able to keep from four to six or seven animals. As we reduced the acreage by cultivation and increased its capacity to produce, we brought the twenty-six acres of land up to the condition that would carry an animal to the acre, such animals as are kept on a dairy farm where the young stock is raised. I never kept twenty-five animals full grown on twenty-five acres; it was about twenty-six acres of cultivated land, and five acres of pasture that we kept as a big cow yard to turn into for exercise. Two years ago that farm was sold. The last four years that that farm was under cultivation, it kept an average of more than one animal to the acre, about sixteen cows, three horses, a full-grown breeding bull, usually a young one, and the balance made up of calves and year-old heifers. During those four years not one straw was bought from outside, but in productive years some was sold, more than one-half of the grain fed was grown on the farm or bought and paid for with crops grown on the farm.

It is a very easy matter to keep a cow to the acre, or four cows to the acre, if you buy everything you feed them; but my aim was to see what land under reasonable treatment could be made to produce; whether a small farm was not worth more than a big one under

certain circumstances. I am fully satisfied that without straining it at all, all the good land in New England can easily keep a mature animal on every two acres, and do it easily. There are hundred-acre farms all over New England, where fifty of it is cultivated and the rest is pasture and wood land, and on those fifty acres not more than ten animals are kept. I presume the average product of the country is not sufficient to keep more than an animal to about five acres. It is unprofitable to go over five acres to get what might be taken from one; you have that extra travel, you have the extra interest to pay if you owe for it, you have the extra tax to pay on the five instead of on one.

It has been suggested by the President that Maine suffers for the want of good pasturage, that the old pastures of the farms are getting poor, running down very badly, and many of them hardly worth fencing. I presume it will take five acres on the average to keep a cow in the summer season on Maine pastures. My reply was, I would not thank any one to give me a poor pasture as a gift to keep my cows on and keep it fenced; but give me one acre, or if I did not want to work very hard, did not want to strain the farm up to its highest, give me two acres of good land to keep a cow on, and I should prefer it to a pasture. I would not pasture cattle on plow land but very little. I would use my pasture if I had it. I would advise you all to use your pastures, so far as you can get the food from them without great expense. If they were a distance away I would keep young stock on them. But my mature cows, that are four, five or six years old, that I wanted to have give about all that they are capable of doing and retain good health, I would keep pretty close at home summer and winter. I would keep them on green crops of various kinds cut and carried to the barn; I would not mind to cut it every day or every half day. All through the haying season we feed our cows on green grass or half-grown grass, or dry, as convenient. All through the harvest season of any crops, oats or barley that were raised for forage, we give them just such as we have on hand at the time, green or dry. I would feed grain freely because grain is cheaper than hay, and feeding grain freely, coarse fodder can be used to advantage. It is not necessary to give cows the best June grass in the pasture in summer, or the best of English hay in the winter. It is just as good feed as can be given, without doubt, but it is too costly.

I have been before Maine audiences so many times and spoken so decidedly in favor of what is called the soiling system, I sometimes think they get a little tired of it, but I believe in the system of raising two and three crops a season. Winter rye is a crop that I raise largely. I aim to keep as much as possible of my corn land and other land that is cropped in the summer covered with winter rye in the winter, letting it grow, cutting it in the spring for hay, feeding all green that can be used, cutting the rest and curing it for hay, and then plowing it up and putting in something else. I am a little farther south than you are; I could some years get three crops when you would not be able to get more than two, but all through Southern Maine two crops of some kind can be grown every year on all your cultivated land.

In regard to fodder corn, I used to raise that, as many people do yet, simply for the corn fodder. I found, by carefully weighing, that corn planted near enough would produce very nearly or quite as many pounds per acre as corn grown thick without ears; the ears are heavy, and the ears are certainly worth more than any other part of the corn plant.

Millet seems to be a crop that is not very well known in the northern part of Maine. It is a valuable plant to be grown on warm land. Barley is an excellent crop; its use is increasing quite rapidly. By raising these different forage crops the farm can be kept producing something, except when the ground is frozen, making the season almost twice as long as it usually is by the old methods.

Sec. Gilbert. This matter of enlarging the stock business is certainly an important one. If we mean business, if we mean to live we ought to thrive; if we are going to try to thrive we must adopt those measures out of which this thrift and prosperity can come. It seems to be a settled conviction among mature minds and the best informed men among us that a line of stock husbandry is the one for us to pursue.

Better work must be done than has been done in the past, if we will meet success. It can not be done in the way that the work has formerly been done. This law should be written in the works of every farmer, that whatever he does must be done in accordance with the highest intelligence among us at the present time. That means the very best work for every operation, and the very best material to work with. If we would study these points and con-

sider them as vital to our success, I think it would lead us on to a different class of work from what we find scattered around over our farms all through the State of Maine. Special work, special effort in special lines of work, and always with the effort to make it especially good.

That the best results are secured from feeding young animals is an established law; there is no further need of our questioning it. That being the case, it leads necessarily to high feeding. Feeding of young animals at a profit must be a system of high feeding, or you cannot get maturity at an age which will leave you any profit. That there is room for a deal of good work in the line of stock husbandry need not be questioned by anybody. That the outlook for the future is brighter than it has been in the past is as certain as the necessity that is placed upon us. While there may be depressions from time to time that will interfere with the profits, yet the general tendency of everything is to a higher scale of prices than has been the rule in the past.

Mr. C. H. Cobb, Poland. Listening to such a valuable paper as has been read in your hearing this afternoon awakens an interest in every farmer. The kind of stock for us to keep is the kind that will pay us best, and the kind that pays us the best is the kind that we will take the best care of.

Feeding grain and feeding liberally to stock is a point that has been investigated for years, and now the very best farmers that we have in our town, in our county and in our State are feeding the most liberally upon grain.

Mr. Barnes of Houlton. Before Mr. Cobb got up there was one point that had not been quite clinched, and I think I will just call your attention to it. I heard Mr. Cheever two years ago on substantially this line of work that I hear him again to-day, and I find that the underlying facts in both essays are the same, and it is a truth which, it seems to me, has escaped the attention of Oxford County people, if I may judge by the course of things transpiring here since I first came here, three years ago. It is this: Assuming it to be correct, that stock husbandry is a source of prosperity, you see all through the paper runs the fact that the speaker bases the success of the enterprise upon the production of milk. I do not believe it can be shown and maintained, that in simply confining yourself to young cattle and steers you can realize the possibilities of stock husbandry. At the same time it is patent to every one that it is

utterly useless to talk about realizing the possibilities of stock husbandry through the milk, which is the only way to do it, and yet have no opportunity for taking care of the milk. I confess that I am in an unfavorable position to-day, from the fact that I am full of the experience connected with the production of milk and its handling, while that method has been rejected in this section of Oxford County. Yet if you will call to mind the drift of the speaker's talk this afternoon and if you will consider Mr. Cobb's experience you will see that pretty shrewd men are sticking to that system. Here, for good reasons, no doubt, you have rejected the cheese factory system. Now, you have got to have the milk, and have got to have the milk handled, in order to make money and realize the possibilities of stock husbandry.

MR. J. K. HAMMOND. I want to say a single word in relation to the paper which has been read to us this afternoon. I have been very much interested in it. We should get home this idea that we should keep young animals and that we should keep them growing all the time. That is the secret of success in stock raising. One of the most difficult things to do is to keep them gaining in our pastures. I do not know of any really practical way to make the pastures better unless it is by cutting down the bushes.

A FARMER. There was one point in Mr. Cheever's talk that I was considerably interested in, but there seems to be some little question about our practising it here; and that is raising two crops on the same land in one year. I would like to ask Mr. Cheever if he thinks we can raise two crops on our land here, having one of them Indian corn?

MR. CHEEVER. It is close work to get the crop of winter rye off in season to plant corn.

FARMER. What is the success in Massachusetts in raising Hungarian grass?

MR. CHEEVER. Hungarian grass is raised more than either of the other millets in my section of Massachusetts. Millet requires a hot season: it wants the best of corn weather, and I am aware that it is not as well adapted to Northern Maine, New Hampshire and Vermont as it is to Connecticut, Rhode Island, Eastern Massachusetts.

I would not object to the pasture. I would not have it understood that I have come here to advise you to throw away your pastures. You can get good pastures week after week all through the summer by working for it.

EVENING.

The subject for the evening was Commercial Fertilizers. A paper was read by the Secretary of the Board on Inspection and Valuation, which was followed by a discussion at length, occupying the entire evening. No report of this session is given.

CUMBERLAND COUNTY.

Institute at Gray.

An Institute was held at the Town Hall, Gray Corner, February 2, at which there was present, Messrs. Holbrook, Harris and Gilbert of the Board, and Mr. Cheever of Massachusetts, Prof. Fernald of the State College and Dr. G. M. Twitchell of the Maine Farmer.

By request of the locality, the subject of the management of agricultural fairs was assigned for the afternoon, and this is the only subject reported. Hon. Warren H. Vinton of Gray opened the subject.

MANAGEMENT OF FAIRS.

Hon. Warren H. Vinton. As one means of increasing the value of the cattle of this town and vicinity, we have formed recently in this town a farmers' club; and we are making pretty extensive preparations for a town fair next fall. We have inaugurated it upon a pretty large scale, and we expect to be able to carry it out, and to hold next fall a successful fair. The proper and successful management of a town fair is no idle matter; it is an important matter, and we have asked these men who have come here, and who know something about it, to give us some suggestions.

We are fortunate to have with us on this occasion Mr. Holbrook, who is President of the Sagadahoc Agricultural Society; he will speak to us upon the management of town fairs.

MR. HOLBROOK. I have been connected as an officer with the Sagadahoc Agricultural Society for a series of years, and we have been in a measure successful as a society. The history of agricultural societies in New England and in Maine is nothing more nor less than the history of the rise and progress and development of agriculture.

What has made these exhibitions a success in the past is that the best men in the country have devoted their attention to them, have given their time and energies to the work of making them a success. The men who have organized these exhibitions have not been nursed in the lap of ignorance; they have been men of cultivated minds, men that have been benevolent, philanthropic, and willing to give themselves to the work.

The question of electing officers is an important one. You want the best men you have in your community; and you do not want, exclusively, any particular class of men. You want to elect men who are posted up on every branch, on every industry which you want represented; and you want the men that have the confidence of the community, men that will give tone to the society, and men that can solicit aid. You know there are always men seeking to get into certain positions; they are anxious to be elected. You do not want that class of men. You do not want the men that come after you—you want the men that you have to go after.

To the officers elected it means work; it means work from the time you elect them until your exhibition is held. There is a class of men in every community that want to be hunted out; you have to go for them. Soon after the election of the officers we go to work and revise a schedule of premiums, and appoint the awarding committees and print their names. We have perhaps two thousand copies of that printed, and we put them in the hands of the farmers the last of March or April, that they may see what premiums are offered.

Always make it a point, whether you make your exhibition a success or not, to pay your bills, if you have to go to the bank to get the means. Let the community know that you are going to pay your bills and they will have confidence in you. If a friend comes to see you and you want him to come again, you use him pretty well. Just so in an exhibition. If you have an exhibition you want to use the people well and they will come again. If you offer liberal premiums the receipts will increase. There is a certain class

of men that will come in, who have the brass almost of highwaymen, and they will try to do their pleasure in everything. You want to give them to understand that they must keep their own place, and that you are going to run the Society.

In the horse department, we think we are successful. By offering liberal purses for trotting we get so large a percentage back in the way of entries that it costs us but very little, whereas, if we should offer small premiums it would be more expensive. We think none the less of our Society because we offer premiums for trotting. Our highest purse is $275. This year we offered $650 in purses, and the expense of trotting was something less than $200 to the society. We get sometimes eighty per cent of purses back. When our purses were light it actually cost the Society more.

Question. Do you think it of any advantage to have horses, by way of paying the bills?

MR. HOLBROOK. Yes, it increases our receipts very much. You cannot run one industry alone. It takes a combination of all the industries in the county to make a fair successful.

SEC. GILBERT. I wish we had some definite rules that could be laid down for a positive success in regard to the management of fairs, but in the absence of that we perhaps can search out some important features on which success largely depends. I am happy to know that this section has formed a farmers' club. There are many important reasons why this may be of advantage to the community. A people situated as you are, interested in agriculture chiefly, certainly should have some central head around which you can congregate to promote the general interest of your community. Nothing better can be devised than an organization of this kind. The holding of exhibitions in addition to the ordinary work of the club may be made a matter of much importance.

In officering a society of this kind there must be a motive beside that of money. A society, located where this one is, never is going to be able to handle a very large amount of money. You have got to do of necessity a great deal of work with a little money, so the first thing should be to learn to work without compensation. The officers should in the start be schooled to the idea that they are going to work for the good of the cause, and not for the little money that may be lying in your treasury. Just so soon as the men you may select for officers have that money in the treasury in view

and make that the leading object in their minds, to that extent they are going to lose sight of the legitimate object that you are to work for, to that extent they will cause a weakening of your powers.

If the burden of this labor is too great for one set of officers to bear any considerable length of time, then change work; you have lots of men that are capable of running a fair. Let one set of officers run it for two years, and then let another set take their turn and perform the duties. Thus you get up an ambition among your farmers to see who can work out the highest success of the Society. You want at all times to study to keep the money out of sight. I could cite the history of several formerly flourishing agricultural societies in our State which have broken down over a struggle for the money there was in the treasury.

I never was a horseman myself, yet I fully believe that horse trotting is a necessary accompaniment to a successful fair. It takes a representation of all interests to make a complete whole. It has been fashionable to grumble at the horse feature of our fairs; I have sometimes thought that this was chronic among farmers, but with all their grumbling no man among them is willing to take the responsibility of running a fair without the horse exhibition. Our people like this amusement, it is popular with them, and as long as it is handled and held in place it is no detriment to the cattle interest. Let the ordinary cattle show and the hall exhibition have their place, let them each receive the attention due them from the managers, and they will all have their attention from the visitors.

The membership and season tickets are formidable things to contend with; and after a long study of the matter and a good deal of experience, I have come to the conclusion that it is better not to have any distinction in regard to admissions. There must of necessity be a membership to a society, but if all hands who are interested in this exhibition, for instance, are members and are admitted free to the exhibition, you can get but little income from their presence, and the result is small receipts. There arises under that management a feeling on the part of the visiting people that there is an undue discrimination, and it appears to them like an undue favor to those who have simply paid one dollar and no more, and there is a good deal of force to it. Let the membership represent your interest in the Society, and then when you want to go into the gates all hands pay just alike, and it puts you on an equality; you will get a little money out of it, and it does not take but a little

out of you to do it. The receipts will be considerably larger, and the thing will run easier, pleasanter and more successfully in every way.

Town fairs in too many cases are a congregation of games, tricksters, peddlers, horse jockeys, and all that sort of thing, which are gathered together for every other purpose except the legitimate one of promoting the interest of agriculture. This is a thing that has got to be managed somewhat. There should be a close discrimination as to what should be admitted. There is some indignity among sensitive people in regard to these questionable features of fairs. It is the best way to begin with clean hands and let people know what you are and what you intend.

If you cannot offer large premiums, offer small ones, and when they are awarded pay them without unnecessary delay. Let it be understood that those who compete and have the awards made to them are going to receive the awards.

DR. TWITCHELL. I thoroughly believe in local exhibitions, and believe that they are the best educators that farmers can have. If you want to keep young men and young women on the farms, and keep them interested in your farm work, you must begin when they are young by cultivating an interest in this kind of work. I know of no way that you can accomplish so much as by these local organizations and exhibitions.

In this work the ladies have an important part to perform. Upon them will fall the preparation of one of the chief features of an exhibition.

The object of this exhibition, like all others, is the good it will do the farming interest. These old men, these gray-haired men, are soon to give up the work, and they want their boys and their grandsons to take hold of it. In commencing this work I believe that it is necessary as well as just for you to offer liberal premiums to the young men for crops grown by them, and for young stock which shall have been raised under their care and attention. I believe in that way you will make farmers of scores, where otherwise they would drift out into the world. Encourage the boys when they are young, educate them into the work, and let them know how to produce.

MR. CHEEVER. I can second the statement made by Dr. Twitchell when he said he believed that town fairs were the best fairs in the world. The best fairs that I have attended have been the small

local fairs that were managed at comparatively little expense, and where money was not the main object, but where the people of a whole town once a year get together and visit each other, which is, in the case of a hundred families, a hundred times cheaper and easier and pleasanter than it is to make a hundred different visits. It makes a holiday, at nobody's expense, that is very pleasant.

I have been connected with a farmers' club in the town of Franklin for some years past, and they have attempted to have a fair occasionally. But it is not all the work of an agricultural society and farmers' club to hold a fair. We have found since then that we have accomplished a great deal more real lasting good from the regular weekly meetings held all through the winter, and the regular monthly or fortnightly meetings held through the summer than it is possible to get merely through the annual fair, and I wish to add to the other thoughts that have been uttered here that I hope your farmers' club here, in starting for the benefit of the agriculture of your town, will hold weekly meetings all through every winter, and discuss subjects pertaining to your interests.

Our farmers' club there does not rule out a lawyer, a minister, a doctor, a blacksmith, or any class of people; any one who will come to the club and pay a dollar is a member, and all questions are discussed that any one wishes to discuss. When we go to the house of the leading school committee man some question is discussed relating to education; when we meet with the lawyer, some question in regard to farm law. The blacksmith gave us one of the best lectures on horse shoeing that I ever heard anywhere. It is said there by many that the farmers' club is the best institution in town; it has done more good for the town than any other institution.

MR. HARRIS. I do not propose to say much, but I want to give my sanction to the talk of Mr. Cheever. I believe he has struck the key note in this whole matter, when he speaks of this social feature connected with the town club. It is the most important, in my judgment, of any part of the whole matter. The social feature is one of the best schools which can be inaugurated in your midst.

MR. BARNES. The only point to which I have arisen to speak in this discussion is suggested by the experience of the Franklin Club in Massachusetts. I have been familiar with the doings of that club. This is a point which I trust has not escaped the keen perception of the organizers of this town club in Gray, the intellectual stimulus which a club may give to its members. It is the intellect that goes

into the work that makes work something more than slavish. The tilling of the ground under the activity of intellectual stimulus is anything but drudgery, and under the condition of farm life in the State of Maine to-day, the success in farming is based upon the proportion of brains that go into the work.

KENNEBEC COUNTY.

Institute at Vassalboro'.

An Institute was held at Vassalboro', February 12. The attendance was large and the interest deep in all the subjects presented. President Wiggin called to order, and Charles W. Jones of Vassalboro' extended a hearty welcome to the Board and the visitors in attendance, to which the Secretary of the Board responded. This was a model Institute in all respects. A full programme was carried out. No report is here given.

SAGADAHOC COUNTY.

Institute at Bowdoinham.

The Institute for Sagadahoc County was held at Bowdoinham Town Hall, February 13, with a good attendance. The forenoon was given to a lecture by Dr. G. M. Twitchell, on the subject of Poultry.

AFTERNOON.

FERTILIZERS:—WHERE TO OBTAIN THEIR ELEMENTS CHEAPEST, AND HOW TO COMPOUND AND APPLY THEM.

By Hon. J. J. H. Gregory, Marblehead, Mass.

I always enjoy speaking to farmers, because I am a farmer myself. I like farmers because they are an honest, frank, square set of men; and they ought to be, because their work brings them in close contact with honest Nature. There is no trickery in Nature; it is fair, square and honest. We may not understand her, but that is not her fault at all. We do not go out to plant with any probability of the thermometer running up to one hundred and fifty degrees above zero to-day, and dropping down below zero to-morrow. We never find ourselves in the darkness of night one moment, and in the blaze of noon the next. Why is this so? Because Nature is frank and honest, and we can rely upon her. She is so honest that we forget to give her credit for it. We think it must be so, but there is no "must be so" about it. God is honest, and therefore Nature is honest. And coming in contact with Nature, we become like her in some degree.

What is manure? Plant food. Just as our human food contains nutriment for muscle, bone and brain, and all parts of the body, so with plant food; it must nourish vegetation. Sugar will sustain life awhile, but not long, because it has not all the elements of nutrition; and so with fine flour. Plants must have, like our own bodies, a variety of food. We must feed to plants the elements that we find in them. Chemistry tells us that all plants are made

up of certain elements—nitrogen, phosphoric acid, potash, iron, lime, soda, magnesia, silica, sulphuric acid, chlorine, etc. Of most of these elements there is an abundant supply in the soil; but there are three which we must supply, if we want plants to grow continually on the same soil. Those elements are nitrogen, phosphoric acid and potash. These three elements every farmer must supply to his soil. Where can he get them the cheapest? In what proportions, and in what way is it best to apply them? The manure question is one almost boundless in its extent, and as interesting as it is extensive. We cannot expect farmers to go very deep into the chemical part of it; they must leave that to their sons; but they can get enough to understand the practical application of it. If we analyze soils we do not ascertain much. We had better analyze plants, and let the plants analyze the soil. When a man begins to investigate this matter of fertilizers, the first thing for him to do is to plant a piece of land and test the different elements. There are certain sets made up by Bowker of Boston, and by other manufacturers, and they will sell you, for five dollars, the full value of five dollars in fertilizers. There will be nitrogen in one bag, phosphoric acid in another, potash in another, and a mixture of all three in another. Then you are to plow your land that you want to test, and use these different substances on different parts of the same piece of land. The manure that gives the best result is the manure that your land especially wants, especially lacks.

Stockbridge's idea was to feed plants just the elements found by analysis to enter into those plants, and which they do not obtain from the soil and air in sufficient quantities. In feeding a plant you must select those forms of plant food which experience has shown are best adapted to produce plant growth.

I use a large amount of fertilizers, some forty or fifty tons a year. I grew twenty acres of onions last year, and thirteen this year, entirely by the use of them. This year I had about ten acres of corn, an acre or more of potatoes, an acre of carrots, several acres of beans and peas, and cucumbers. They all did first-rate on fertilizers wholly, with nothing else. I have great faith in them. I do not say, because they have succeeded so well with me, that they will with you. But test your soils. You can raise many crops far cheaper by fertilizers than with barn manure. Just what measure of success you will meet by the use of any particular fertilizer, I cannot say; nor whether the fertilizer that succeeds with your

neighbor will succeed with you. I have no interest in fertilizers; I do not sell any; I simply give you the benefit of my experience.

Soils vary in their composition. We don't have any twin acres in our farms. If our soil was made simply by the decomposition of the rocks in that locality, there might be some chance of finding one acre like another, but being made up of drift, every acre differs, in a measure, from the next. Therefore it is not fair to say of a fertilizer, "It didn't do anything for me, and therefore it is not good for anything." It may be first-rate for your neighbor. What succeeds on one piece of land may fail on another. One season is warm and dry, and another cold and wet. The state of the ground may happen to be such that a fertilizer will fail at one time, when it would succeed at another. Nitrogen may be in condition to be taken up in one case, and not in the other. You can get hold of some of these elementary things that enter into the problem of plant growth, and they will aid you in making fair tests. The first thing is to test your land and see what it especially needs, and then select your fertilizer with care and judgment, and you will see the benefit of it.

In barn-yard manure you have a large mass of material that does not amount to anything. It is seven-tenths water that you carry out, and you carry out a great amount of silica that don't amount to anything. You want, so far as you can, to reject what is not wanted, and give more of what is wanted. That is what fertilizers purport to do. At the same time there is a certain use for barn-yard manure. There are certain soils where they do good mechanically. It is possible that they retain moisture, and help in that way. Barn-yard manure makes humus, that tends to collect ammonia, and let it out to the plant gradually. Barn-yard manure carries more ammonia than is wanted, and the humus holds it. Take a load of manure containing 1000 pounds, and you find in that 802 pounds of water, $5\frac{1}{2}$ pounds of nitrogen, $4\frac{1}{2}$ pounds of potash, $5\frac{1}{2}$ pounds of phosphoric acid, 14 pounds of silica, and certain amounts of lime, iron, soda, chlorine, etc. That is what you have in that load. All you want is nitrogen, phosphoric acid and potash. There is only $5\frac{1}{2}$ pounds of nitrogen; you might carry that in one pocket, and the $5\frac{1}{2}$ pounds of phosphoric acid in another, and the $4\frac{1}{2}$ pounds of potash in another. So far, then, as the essential elements are concerned, you can carry in your pockets what your horse will sweat under. But there is a little fiction in this.

You cannot get these elements in a pure form, but you can get them in a form so the quantity named would not weigh more than fifty-two pounds, and you have all the real manurial value that you have in your horse load. Barn-yard manure acts mechanically, to be sure, and is of some benefit in that way; it helps let the air into the soil, and it forms humus; but you can get humus without it. This is the argument for the fertilizers. I am not, however, at war against these grosser manures. I use hundreds of cords in various forms. I use a hundred cords of night soil a year, and some years two hundred cords; and I use rock-weed and hen manure. I know something of the analysis of them, and how to handle them; and of course there is a good deal to be learned by experiments in these things.

I am going more and more into these fertilizers on real solid proof and not on theories. It costs me thousands of dollars every year for manure, and I want to get the most for my money. What I give you is the result of experience in working out this problem. I am not a chemist, but I have been driven to learn something of it, and I have found it to my advantage.

As to the purchase of fertilizers. I have no one kind to advocate especially. In time you will be able to make your own to advantage, possibly. Our farmers want more drilling in elementary principles pertaining to farming, so they will understand better what a formula is, and all about picking up this thing and that thing, and putting them together, and making your own fertilizers. If you cannot do it yourselves, you might have a head man to do it for several of you. In one town that I have in mind, several of the farmers have a graduate of the Agricultural College to guide them. Young men who expect to be farmers need the training of our agricultural schools.

I met this graduate in Boston a short time ago. He had come there for that community of farmers, with fifteen hundred dollars in his pocket to buy chemicals for them,—ammonia, potash and phosphoric acid. He went to all the dealers, and having a considerable sum of cash in his hands, and knowing what he was buying, he succeeded in getting low prices. He carried the materials back and compounded them for those farmers. We offer a hundred dollars in our Agricultural Society every year to help a young man get an education; but we get it all back in the new ideas he will give us in our meetings; he will set our minds all to working.

I say you are not prepared yet to make your own fertilizers. Meanwhile you have got to buy of dealers. Now, they do not make so much money as you think. I know something of what they make, because I know what the elements cost. They have bad debts. They have to trust out all their product, and the money is a long time coming in. They make money because they make large sales, and not because their profits are unreasonable. Are they going to cheat you? No; they cannot afford to. In the South Carolina Station, in the 600 specimens that were analyzed, they found but one that was a cheat. It didn't use to be so, because the dealers themselves did not then know what they were about. When these laws came into effect they took hold of the dealers, and they were compelled to know about it. Your Cumberland phosphate I bought among the first of my purchases of these articles, away back twenty-five or thirty years ago, and it analyzes first-rate to-day; it is a grand good thing. I have no doubt Bradley's is good.

There is a difference between a phosphate and a complete fertilizer. A complete fertilizer has nitrogen, phosphoric acid and potash. Every crop wants more or less of all of these. The economy is in knowing which crop and which soil wants most of this, that and the other, so making your fertilizer correct. These special formulas that these manufacturers issue have performed their part very well, as a rule. Stockbridge has altered all his formulas. They are improving all the time. It is for their interest to give you a good fertilizer that will grow the crop you buy it for. It would be cutting their own throats to sell you an article that will fail to do what they say it will do. They do not succeed every time, but on the whole they have succeeded.

The only point is, which is the most economical. If you can make your own at a less price, don't pay forty dollars a ton for it. But you will find it is some little trouble to make it.

Your fish waste is very rich in ammonia and phosphoric acid. It ought not to be allowed to slip away from your coast to be brought back here again. Fish liver chum is very rich. According to analysis, it is worth $18.33 a ton. It is worth that just as much as Cumberland phosphate is worth $40 a ton, and yet you can get it in my vicinity for $4.50 per ton. Halibut chum is worth $14.99. They quoted it to me the other day at $7 per ton. It is rich in phosphoric acid and ammonia. Liver is richer in ammonia, but it is nastier to handle. Porgy chum is worth $24. I believe the

porgy has left your northern shores and gone south; but you can get herring chum, and it is worth very nearly the same. I have bought that for $6.50. If these chums are made at a regular chum factory, where they make oil, they are all right, but if they are made on the sea coast, they are apt to have a good deal of salt in them. They salt it to keep it, and the salt is apt to kill your plants, but if you have an honest man to deal with, he will tell you about what it is. If you are afraid of salt, use it on plants that salt will not injure, as onions and cabbages. If you use fish waste, put a lot of plaster with it. Plaster has great power of catching and holding ammonia. The plaster must be damp, but the fish waste will dampen it enough. Cover it over with earth, and the earth will help keep the ammonia. If your manure heap begins to smell of ammonia, throw earth over it and it will catch it. You can make a compost yourselves with this fish waste that will be very rich indeed.

Dog fish is a good thing. Off Boothbay they catch great numbers of them, and take out their livers for sale. They will sell the fish for about one cent apiece. The great trouble is, they make a sticky fertilizer, but there is a way of getting over that. Near Boston there is a large farm where they buy a large quantity of it and mix it with their stable manure to get the stickiness out. I think if you can get them for a cent apiece and treat them in that way, you will find it profitable. I am going to do it. Last year I got one lot. Be sure and put plaster with your fish waste; it will take up about twenty per cent of its weight of ammonia. Pure sand will hold ammonia. Some people ask, "Why do you put soil behind your cattle?" There is a very good reason for it. Even though it is sand it will hold ammonia. Ammonia is one of the most plentiful things in the world, but it is one of the hardest things to get hold of. I put a ton of fish on an acre of my land this winter, on the snow. There is no trouble about its wasting. You will give up that idea of wasting, after you have tried it awhile.

My principal source of ammonia, outside of what I get in my Ames manure, is sulphate of ammonia. You will not get cheated, if the articles you buy are really what they are said to be. If they sell you an article warranted to contain so much nitrogen, and that nitrogen comes from hoofs and horns and leather, that would not be honest, because they sell it for nitrogen that is soluble. Guano used to be our great resource for nitrogen, and it was a capital

resource. If you can get it now, get it. It is a cheap source for everything that is in it. It has not very much potash, but it has some. I get mine from New York. Cotton seed cake is very rich, but it is better to feed first, and then use the manure. Here is a thing to be borne in mind—that the value of the manure from your stock depends largely on what you feed to them.

Muck is a grand source of ammonia. You will hear farmers say, "I put dry muck with barn manure, and I get as good results as though it was all barn manure. I believe it is worth as much, cord for cord," and they are right. It is very rich in ammonia, nearly three times as rich as cow manure. Some samples analyze as high as 3 per cent of ammonia, and the average muck contains about 1.3 per cent of ammonia, while the average stable manure contains $\frac{1}{2}$ of one per cent. But the nitrogen in muck is latent. One man will say, "It don't do me any good"; and another will say, "It did first-rate with me." Both are right. The conditions are different. There is a great manurial value in muck, if you can only get it out. The fermenting and mixing with alkalies, ashes, or caustic lime, will bring it out. I have used hundreds and hundreds of cords of it.

Bone is very rich in plant food. It has 58 per cent of phosphate of lime and 30 per cent of gelatine, and a very little carbonate of lime. Of this you can get of phosphoric acid 26 per cent. From gelatine we get nitrogen. A great many people regard dead animals as a nuisance, and simply seek to get rid of them in the easiest manner possible, but as a matter of fact they may be made of great value.

Ashes and bone make a good fertilizer. In ashes you give back to the plants everything the plants had in them in the way of mineral matter, everything that the plant has taken from the soil itself. In bones you give back to the soil all that the animal took from his food to make his frame. The animals take it up and give it back again. There is a perfect round in nature; life is supported by death. An animal dies and gives its substance back to earth; plants take the same substance from the earth; animals take it from the plants in their food, and when the animal dies it goes back to earth again.

Some people say they don't like these fertilizers because they are all used up in one year. If you want your bone to last, put it on in a coarse form. I bought perhaps twenty tons of knuckle bones,

at a low price, eight or ten years ago. They had been under heavy steam pressure and would crumble very well. The coarse parts I put in my pear orchard, and I get two enormous crops of grass every year and splendid crops of pears. But the argument against fertilizers that they will not last but one year is the best argument in the world for them. What do you put them on for? You want them to go into your crops. The trouble with barn-yard manure is that it cannot go into the crops the first year to any great extent; you have to put on more than the crop needs, to get a crop, because only a small part of it can be digested that year; but when you use fertilizers you put on just about what the crop needs.

Phosphates are made from bone largely. There is also a South Carolina rock, that they have found lately, made from the decayed bones of ancient fish. There are hundreds of square miles of it, and in some places it is eighty feet deep.

Hard wood ashes are worth about thirty-five cents a bushel. There is a great variety in ashes. Some of them look very white, but they are just as good; that whiteness is the lime; the potash is there just as much. If manures do not ferment, ashes do not hurt them, but you want to be careful about that. I would not put ashes with hen manure, or with fish, unless I was going to use the manure at once. Lime ashes is wood ash mixed with about five times its weight of partly slacked lime. A gentleman in Boston that deals in them brought me a few one day. I took them and sifted them, and I found that over half of them was nothing more than lime, and the remainder must have been at least half lime. That at Rockland is worth something, of course, but I should not want to give more than seven cents a bushel for them. Ashes from brick kilns are worth about the same.

Question. How much are bones actually worth?

MR. GREGORY. It is hard to tell what they are worth. As market matters go, they are worth about what they ask for them, about $38 a ton for pure bone. They have nearly four per cent of nitrogen, and nearly twenty-five per cent of phosphoric acid. I prefer steamed bone to raw bone. It is more digestible.

Question. What is the best form to buy potash in?

MR. GREGORY. In muriate of potash your potash will cost about four cents a pound, and in ashes it will cost about seven cents.

Ashes have recently come from the soil, and the elements are in good condition to go back to the soil.

Question. Have bones any particular value after being burned?

MR. GREGORY. Yes. In burning them you destroy only the ammonia, but you have the phosphoric acid left, which is valuable. I do not believe much in treating bones ourselves, because the best we can do is to burn them, and then we lose all the nitrogen.

Kainite is one of the cheapest sources of potash. It comes from Germany where there is an ocean bed from which the ocean has evaporated and left these vast beds of salts. It is valuable to scatter in your stable as an absorbent, as it will absorb ammonia, and that is a very important thing.

I will tell you how to make your own phosphate from Carolina rock. Take 450 pounds of Carolina rock, ten gallons of water and a carboy of vitriol. Pour in your water and add your vitriol, and then add your rock slowly, and after the fermentation is over, pitch it out and let it dry. It is very rich in phosphate, and that is a good way to make soluble phosphoric acid. There is no ammonia in it and no potash; I should get my potash and ammonia to add to it where I could get them the cheapest.

You can get your phosphoric acid in that way cheaper than from bone, and it is just as good. There is only this difference: If any part of the Carolina rock is not dissolved, it is not worth anything, but if there is any bone that is not dissolved, it is worth something.

Questions. With regard to these New York quotations for fertilizers,—for instance dissolved bone at $25 a ton;—whether that is the genuine article.

MR. GREGORY. It depends on who the man is that offers it. If I am going to buy anything where there is a chance of adulteration, I don't like to go to New York; I would rather get it in New England somewhere, but if I had an analysis by a responsible man behind it, I should not be afraid to buy it.

What you want is an experiment station. If I get puzzled I send out to our experiment station, and it is a vast help. You are all adrift until you get one. When you get one, if you have a fertilizer offered to you and you don't know whether it is good for anything, just send a sample to the station and they will tell you whether it is good for anything or not.

Question. How about cotton seed meal?

MR. GREGORY. I have used that. It has 6½ per cent of ammonia and 2 per cent of potash and nearly 3 per cent of phosphoric acid. It is a grand good fertilizer to put right onto your ground.

Question. How much is cotton seed meal worth as a fertilizer?

MR. GREGORY. You can figure it. Ammonia is worth 18 cents a pound. In every hundred pounds of cotton seed there is 6½ pounds of ammonia, or 130 pounds in a ton. One hundred and thirty pounds at 18 cents a pound gives you $23.40 as the value of the ammonia. Of potash there is 2 per cent, or 40 pounds in a ton, which at 5 cents a pound gives $2.00 as the value of the potash. Of phosphoric acid there is 2 9-10 per cent, or 58 pounds in a ton, which at 10 cents a pound gives $5.80 as the value of the phosphoric acid. Adding these together, you find that these three elements in a ton of cotton seed are worth $31.20. A ton of cotton seed costs you $28.00. If you feed it you lose but little of this value; you have it about all left in the manure. They use vast amounts of it in the South. That and the phosphates are the basis of the southern agriculture to-day.

Question. There is one question that I would like to ask. I am not much of a farmer, but I am something of a fisherman. We have immense quantities of waste fish, and the trouble is to know how to take care of the fish to save it until it can be applied to the soil. We cannot spend much time on it when we get it, because we are too busy, and so we throw it away. We throw enough into the river to enrich the whole town, if we knew how to take care of it. Now can you tell us what measures we can take to preserve it until it can be utilized?

MR. GREGORY. It wants a good deal of mixing material. I should have a lot of muck piled up and dried, and I should have a lot of plaster ready, and I should put the fish into the muck and put some plaster between the layers of fish and cover it over well with muck.

WASHINGTON COUNTY.

Institute at Charlotte.

By invitation of the Charlotte Grange, a Farmers' Institute was held at Charlotte, March 11th. The interest in this meeting was wide-spread, and drew together a large attendance from a wide circuit. Free entertainment for all was furnished by the members of the Grange and other citizens. The subject for the occasion was Stock Husbandry and the Dairy. There were present Edward Wiggin, President of the Board; A. R. Lincoln, member for the County; Francis Barnes of the Nickerson Cheese Factory, Houlton; and L. K. Littlefield of the Winthrop Creamery.

CHEESE.

By Francis Barnes, Houlton.

The present phases of the cheese trade, and also of the manufacture of cheese, are of more than passing interest to the farmers of Maine, for the existing conditions are the outgrowth of an experience which has been most dearly bought by some; and by others, most wisely learned. It was thought, some years ago, that the associated form of dairying had come into the State to stay; and, with the fullest knowledge of the many abortive attempts, the statement may be considered a safe one that where, now, the associated method is employed, there it will continue, to the satisfaction and profit of all connected. A careful survey of the State shows the factory system of dairying firmly rooted in the Androscoggin valley, in Kennebec County, and also in Aroostook.

To those who are interested in the making of cheese, and who also believe that the conditions of Maine farms are peculiarly adapted to the production of fine cheese, the survival of the cheese factory, in localities where factory butter making has been introduced, is a most gratifying justification of the ground they have taken in the discussions. So many mushroom factories had come up in a night, as it were, and so soon disappeared again, the common feeling was that the factory system of cheese making was altogether unadapted

to our situation, and, like the beet sugar industry, must give place. When, therefore, the apostles of the butter factory began their work, three years since, it was easy to say, "Cheese making has failed, now take hold of the butter business and you have gained all you can ask." They also said that once the butter-making system entered upon, no longer would the manufacture of cheese continue in the same locality. The gift of prophecy was not on those men despite their confident assertions, and they really only used the privilege of guessing as to what the future would unfold. At the time of this writing, April, 1885, the cheese factory interest in the town of Winthrop is more firmly established than at any time before. In the town of Turner the cheese holds its place still, and it is a question right before the men of the Centre, whether, or not, to take up the cheese making again for the summer months.

The managers of a very prosperous and promising butter factory, in a town where cheese making had not been attempted, are pondering the question of adding the cheese vats and press for some months of the season.

The causes for this survival of the cheese factory, and the renewed force of the arguments in its favor, are not many or far to seek. They are three in number, and sufficient to completely cover the ground.

First. The low prices of butter in the summer months.

Second. The relatively large amount of caseine in the milk as compared with butter fat.

Third. The fact that a choice quality of cheese can be made right through the summer season.

These statements are indeed but axioms, and do not need to be enforced by argument, but may be illustrated or amplified till their force is more clearly appreciated.

Butter and cheese are produced from milk in the proportion of one pound of butter to two and three pounds of cheese. These figures are obtained from the averages of herds, for it would be impossible to argue from such prodigies as Princess 2nd, though it would be very interesting to know what kind of cheese, and how much, such milk as hers would make. With the usual ratio of yield as a guide, the careful scanning of market reports for a single season will show which way the balance of profit tends.

Greater difficulty is experienced in admitting the third statement to be self-evident, from the fact that the habit has so commonly obtained of making cheese through May and June, and then putting it on the market as quickly as possible. This practice has involved the owner in a two-fold trouble; he sells his cheese at lowest figures, and the margin of profit vanishes; or he keeps till fall a kind of cheese which then is, after all, worth no more than he might have taken for it in the summer. It is easy to admit that the unprofitableness of such practice is self-evident. The best experience shows that the May cheese should be made to be disposed of at an early day, but, after the advent of June, advantage should be taken of the favorable climate of Maine, and the cheese made to keep its good qualities unimpaired till the fall prices are in the ascendant. This course of procedure takes the milk product out of the market during the continuance of the summer heat and the inevitably low values. The success of such a plan depends upon clear and thorough comprehension of the situation by a goodly number of milkmen, and requisite skill in the factory. It is not within the scope of this article to discuss the details of cheese making, and reference under that head can be had to the reports of the Board of Agriculture for 1881 and 1882, where the points involved are all enlarged upon.

The favorable effect of our climate may well be dwelt upon, for more and more is learned on that subject from one year to another. The same conditions which make our State so attractive a place of resort for the crowds of dwellers in the cities and lands further south, make it, as well, one of the most favored spots for the making and curing of choice cheese.

The actual time of scorching heat is of but short duration, and even those seasons are tempered by comparatively cool nights. Again, as in last July, a succession of fogs and winds from the sea will cause such atmospheric conditions that, for days at a time, the interval is a very paradise for a cheese maker. One of the most noted and strictly fancy varieties of the Swiss cheese is made in a comparatively rude sort of way, with very ordinary appliances; but it is all slowly and carefully cured in the caverns in the sides of their mountains. These receptacles are necessarily both cool and damp, and the ripening process in the curds goes on, then and there, till the most desirable results are produced.

The Limburger cheese, the pride and joy of our Teutonic brethren, owes much of its peculiar qualities to the underground curing which is given to it. Our northern and eastern situation, a comparatively high latitude, and a nearness to the fogs and damps of the Bay of Fundy and Gulf of St. Lawrence, makes our summers what they are. A full survey of these material conditions brings our third statement fully into the line of indisputable truth.

Since the profitableness of the cheese making has thus been fully maintained, even in the very centre of the winter dairying region, it would clearly follow that in the remoter portions of the State, where facilities for the speedy marketing of butter do not exist, and where the old-fashioned ideas about feeding are still prevalent, there should be found a measure of increase of the business in cheese from year to year. Such is the experience in Aroostook and Washington Counties. In the latter, the movement is slow, but when the attention of the people is once turned from the fish and lumber, the supreme advantage of associated dairying is right before them. It may be that some of the most interesting efforts in that line will yet be wrought out, right on the verge of the ocean and the bay.

Aroostook County presses right forward in the matter, and not only is there no step backward, but in the aggregate of production she leads, by far, the others. One new factory is to start at Blaine this season, and the others will see an increased volume of work. No method of farming is found so remunerative as that which turns upon the feeding and care of the cows. For a staple business no other kind is so well adapted to the peculiar features of the St. John valley. Most interesting corroboration of this position is found in the practice just over the border. In Carleton County, New Brunswick, a twin section of Aroostook in all natural features, the making of cheese engages the efforts of the farmers more and more. It is very probable that we are entering upon a period of lower values for cheese than has prevailed in the last seven or eight years, but relatively with other products of the farm, the value is remunerative.

One interesting feature of the general situation is the rapid expansion of the cheese industry in the western part of Canada. This increased make, too, has a marked effect upon the price of our cheese, for although we have the high wall of the tariff about us, yet the English market, where both Canadian and American cheese meet together, is the place from which values are set. The makers

of Canada, after their triumph at the Centennial, were wise enough to push right on in that line which had given them the victory. They have not turned aside to dabble with butter and skim cheese, or with lard cheese, or even cheese "fatted with an emulsion of oils." They have made one quality of strictly fine, whole milk grade, and now lead, in value per pound, the New York State make. This is a proud position to have won, but it has been legitimately done; and the men of New York have only themselves to thank, for they have been seduced by the siren strains of increased profit through butter and skim cheese, or the direct frauds of lard and oil mixtures, till the character of the State make is most seriously impaired. The parties who, for a trifling personal gain, have led the milkmen of New York into this slough of inferior products, have a most serious charge to meet at the bar of the public conscience.

The lesson to the milk owners of Maine is to continue in the path of honest work. Make as good cheese as the best Canadian, and be prepared for the chances and fluctuations of the market, with a thoroughly good article.

A question arises here, and one which is most pertinent, "Will the available supply of cheese soon exceed the demand? Shall we soon see in this sphere of activity the same lessened values that now obtain in wheat, in consequence of the great enlargement of the area of production?" One thing, it must be admitted, has already come to pass, and that is, that there is a surfeit of low grades of cheese. There can be no inducement, from a money point of view, to increase the amount of such qualities. It is difficult to understand why parties will continue to make and try to sell a grade which has been quoted this past season at one and two cents per pound. Theorists tell us there is a great deal of nourishment in skim-milk, but the inexorable logic of results shows us that, if put on the market in the form of cheese, it will not sell for the cost of making. A second admission may be made, that the supply of badly-made, imperfectly-cured cheese is in excess of the demand. The makers and holders of such stuff must lose their investment. The course of things with reference to the butter trade the past few years, will help in answer to the questions above. Notwithstanding the vast amounts of fraudulent butter, and lard compounds which are fabricated, and, in spite also of the still immense amount of inferior dairy butter that is made, the prices at which strictly choice

lines of butter sell are satisfactory to the owners, for they are high enough to leave a good margin of profit.

The dairy farmer may have a measure of assurance over his brother who produces nothing but wheat, from the fact that the raising of wheat is of the lowest and simplest form of agricultural method to be entered upon anywhere, by any person; but the dairy is more closely confined to localities, and calls for more capital and skill in proportion.

While it might not be prudent to give the questions an absolute negative, and declare that there is no danger of supply equalling the demand, still it does seem fair to conclude that there is yet abundant opportunity for the making and handling of choice cheese, at fair margins of profit.

It is a comparatively easy transition of our thought from the question of quality to that of expert opinion on cheese and its kindred matters. A newspaper correspondent recently expressed his regrets that the "dairy experts" do not give us more "standards" to work to; and then quoted quite at length some instances of great divergence of opinion on the part of these men. The names of a half-dozen of so-called experts will occur to any person who is in the habit of reading the current agricultural literature. These men, for the most part, float along where honors are easy, and are either paid writers for papers or salaried officials at experimental farms or stations. In each case they must earn their pay, and show a reason for their particular fitness for a place. This force-put leads, most commonly, to the adoption of some theory as to proper practice, and then facts are twisted to suit the theory. Each theory has a "standard," and it must be maintained. This phase of the matter becomes all the more glaring when a manufacturing concern seeks to force a patent appliance onto the dairy community. The theory is made to conform to the special machine in hand, and the expert authority endorses theory and mechanism in fulsome terms. The publishers of many of the newspapers are open to the same criticism as the manufacturers above, for they wish a certain space on the page of the paper filled with "new and original" matter, a direct incentive to novel theorizing. The amount of crude, ill-digested matter which has been put before the American public in this way would fill many a volume, and it is full proof of the easy good-nature of Brother Jonathan that so much of it is paid for by public taxation.

If the newspaper professors, and the professors of agriculture, and the experiment stations would be willing to agree on the few established facts of science with reference to milk, and confine their reasoning thereto, they might be of more help to the men who make their livelihood by handling milk. These men in their turn would not be forced to regard the utterances of the professors with so much of suspicion, and say, publicly, that they get no help from such sources.

At a dairymen's meeting, this past winter, two of these airy writers ventilated their little notions, and when they were through, a thorough master of the manipulation of milk simply stated that he never saw a prime cheese made, in the critical season, by the carrying out of any such suggestions.

If we seek to inquire what assistance may be given by the man of science to the cheese maker, careful attention must first be given to the definition of the terms employed in the wording of the inquiry. A scientific statement, with reference to material things, is based upon a most careful observation of all the facts which bear upon the subject in hand. By a most careful sifting out of all irrelevant matter, and a repetition, again and again, of the phenomena of the facts in hand, the careful observer is able at length to bring together and arrange the results of his manifold attempts in an orderly, systematic method.

What is known? What may be further known within the limitations of human powers? These are the questions the truly wise man asks, and with a mind diverted of prejudice, and soaring far above the snares of special theories, he seeks for what is to be found within the operation of the laws which the Creator has given. Such an observer is as humble as he is wise, and discovers, in due time, the barrier between the known and the unknown. In reference to milk, the statement has been found to be that it is not to be regarded as a definite chemical compound, nor even as a mixture of bodies in fixed and invariable proportions; that the albuminoids, of which caseine is a sample, are the most important of all nitrogenous carbon compounds, but, unfortunately, we know but little of their chemical composition. In the face of these conclusions there are numerous pseudo-scientists who are ever ready, for about two dollars a column, to write about milk as if it were an ordinary chemical body and its analysis as simple a matter as that of chalk. Legislative bodies, too, are endeavoring to enact the fixed amount

of solids to be in milk. The only apparent difficulty in their way seems to be that they have failed to appoint a committee of conference with the cow and have her a party to the scheme.

The old Greek philosopher's declaration, that to know one's self was the most difficult of all knowledge, is still accepted by scholars as the truth; and a man cannot become a scientific expert until he has been profoundly penetrated by this aphorism, and is ready to note facts and draw conclusions with a constant feeling of self-distrust.

Under the clear and searching light of such definitions the claims of those experts alluded to by the correspondent of the paper soon wither away to comparative nothingness. It is to be doubted whether there is a scientific expert on cheese in the United States, from the fact that of the few men who are cultivated sufficiently to take such a place, no one has ever been engaged in cheese making.

It is an interesting matter of record for this present writing, that the two leading authorities in matters of cheese making, both in the United States, Canada and Great Britain, are two men who have no more elaborate prefix to their names than plain "Mr.", and who have devoted years of assiduous application to the actual making of cheese as a source of livelihood.

The gradual decadence of the home cheese-making industry is well worthy of notice at the present time. As the women of the older generation lay down the active duties of their life-long experience, the younger women are not found to take up the same lines of activity. This failure in the succession may arise from the fact that the indispensable tact and discernment of the skilful maker of cheese is not inherited, and the young woman is soon and easily discouraged by failure, or the true cause may be referred back to that gangrenous condition of our modern society life which produces the paucity of children in so many families, on the one hand, and the insane desire, on the other, to rush away from the peace and plenty of farm life into the vortex of dissipation and satiety of the town. A proper consideration of a subject so grave belongs rather to the sphere of the philosopher in morals and politics, but no thoughtful observer, at any stand-point on the line of life's journey, can fail to be impressed with the serious import of such phases of our "highest" civilization.

There is another and strictly legitimate reason for the giving up of the home cheese making to be found in the successful and increas-

ing development of the associated system. In the strict theory of the case no private butter or cheese making should continue within the circuit of the work of a factory, and the most progressive dwellers in such a locality gladly recognize that theory and make it their practice.

A noted farmer and dairyman said recently that cheese had always been made at his home ever since he could remember, but no more would be in the future. With the same or greater stock of cows in constant keeping on the place, the modern system of handling the milk had altogether and irrevocably superseded the old-time ways.

To all of us who are financially interested in these innovations, the elimination and disappearance of the home cheese is an unmixed good. For there is more room to dispose of the factory make, and with the disappearance of these special dairy varieties will go the particular taste which is catered to by them. The particular excellence of dairy cheese has been supposed to lie in a special softness and richness of curd. This is a dangerous form of cheese, in a money point of view, for it is short lived at the best. The manufacture of such kinds is attended with inevitable loss, for the safety factor is very small. Now the unsalable cheese on the farm can readily be eaten up by the family, or the chickens, but not so at the factory. As the Mayor of the city once tersely said, after looking over an extravagant bill for aldermanic cigars, "The city of Portland does not smoke," so we can say, "The factory does not eat cheese." We must make that kind which at all times will always sell on the market. By opportunities of observation, which widen every year, the unevenness of the domestic cheese in point of quality is made more and more apparent. By the conditions imposed upon the makers, the work is a succession of guesses, and the guess is often completely baffled by the elusive and subtle nature of milk. Each thrifty housekeeper, as she tells her story, makes very nice cheese, but at the next house the inquirer learns, invariably, that the neighbor just back on the road has more or less poor cheese. Both stories are true and each is the supplement of the other; but the cautious factory man sees at once that he must avoid such contingencies in his make. If the advocates of the associated system are wise, and as careful as wise, they will put in the place of this evanescent form of cheese a variety which gains converts continually.

EVENING.

INTELLECTUAL AND SOCIAL CULTURE AMONG FARMERS.

By Edward Wiggin, President of the Board.

Mr. Chairman, Ladies and Gentlemen:

I am to speak to you for a short time upon the subject of Intellectual and Social Culture among Farmers, a subject, the importance of which American farmers are realizing more and more, and one to which they are paying increasing attention as the years roll by. I do this, not with any pretense of setting myself up as a teacher in these matters, but with the hope that some hint may be dropped which may help the farmers of Maine to a higher appreciation of the dignity of their calling, and may encourage them as a class to take that advanced position to which they will be entitled when they shall consider it of sufficient importance to prepare themselves to sustain it. Although I am persuaded that the farmers of Maine will compare favorably with their brethren in other States in intellectual culture and social refinement, yet that there is still much room for improvement in this respect, none, I think, will presume to deny; and this improvement will be made, and a higher standard of culture and refinement reached, just so rapidly and surely as farmers are brought to see and appreciate the advantages it will bring to themselves and their families. Farmers have so long been accustomed to be called the "bone and sinew" of the land that too many of them have come to think that bone and sinew is all that is necessary in their calling, and have been content to concede to other professions the monopoly of brains and of mental culture.

To dig and delve without intelligent aim is not agriculture. Nature, in her lavish kindness, may supply the ignorant delver with a bare subsistence in payment for the toil of his hands, but he is only *existing*, after all, and not *living*, in the true sense of the word. Only the intelligent, thinking farmer, who uses his brains as well as his hands, appreciates the true value and object of his toil, and sees something more in his life-work than continual drudgery and a mere struggle for existence.

While it is not to be expected, nor will the nature of his occupation permit, that the farmer should pay as much attention to intellectual pursuits as his professional neighbor, or as those engaged in callings which afford more leisure for the cultivation of the mind, still he will find that there are many leisure hours, which, if rightly improved, will bring him a rich harvest of golden treasures which no drouth can injure, and no flood sweep away. I am aware that much has been said and written upon this subject by persons little acquainted with the toil and labor of a farmer's life, and many fine spun theories and impracticable ideas have been advanced by men whose hands are far more familiar with the pen and the glove than with the plow or the hoe. I know that the farmer's lot is often a struggle, and a hard one too, with poverty, and a continual fight to keep the wolf from the door and to provide for the numerous wants of an increasing family, though this is true and perhaps to a greater extent in other callings than ours. It is to help him in his struggle, and to give him courage and self-reliance in the fight that he needs the assistance of the agencies we are considering. I appreciate the fact that in the busy season of the year, when every hour of sunshine is improved, when the farmer has labored all the long day in the field, that he is not in condition then to apply himself to studies of any kind. It is rest that he needs then, and Nature has so ordered it, and most kindly too, that the bodily powers and energies, though fatigued and partially exhausted by a day of honest toil, may be recuperated and restored by a season of healthy, refreshing sleep, and the hard working husbandman may rise with the lark, re-invigorated and renewed by a slumber such as the man of leisure or the mere pleasure seeker never knew in all his life.

But there are seasons of the year, and there are odd days here and there at all seasons, when the farmer has more or less leisure, and it is by the improvement of these random hours that the golden store is to be gathered. How many farmers there are who spend too many valuable hours lounging about the village store, when they might devote that same time, or a greater portion of it, to the study of valuable works and to the gathering in of a rich store of knowledge! The time has gone by when the American farmer can be looked down upon as a boor or a mere clod-hopper, unfit by nature or attainments to associate with his neighbor who pursues a less laborious calling. The tendencies of the age are towards an improvement in this respect. Advanced and liberal ideas are obtaining

among agriculturists; farmers are becoming educated, not only in matters which pertain to their own vocation, but also to a greater extent than ever before in those which engage the attention of thinking and reading men the world over. Farmers, as a class, are conservative men and slow to leave the old ruts; but we are glad to observe that the more general dissemination of agricultural literature, and the increasing custom of assembling together in societies of whatever name, for the discussion of questions pertaining to agriculture, have done and are doing much to break up this old-time conservatism; and to-day the one word which is inscribed upon the banner of the New England farmer especially is "Progress." Time was, when farming as carried on by the majority was a mere blind, hap-hazard business at best, each man considering it a sufficient reason for pursuing a certain course in regard to his crops that his father so conducted it and therefore it must be right; with no intelligent idea of how crops grow or of what kind of plant food is necessary to sustain vegetable life; and the so-called book farmer was looked upon as a sort of harmless lunatic, whose improved crop was invariably attributed to his "luck."

As a first step towards improvement in intellectual culture, I would suggest that the farmer should become better versed in matters pertaining to agriculture. It is manifestly impossible, nor is it necessary, that every farmer should be a practical chemist or a skilful botanist, or that he should be thoroughly acquainted with all the minutiæ of the chemical composition of soils and vegetation, or be able to analyze any plant at sight, and tell its particular order and species, and technical designation. This of course would require a special training for which he has generally neither the time nor inclination. But it is possible, and we assert that it is necessary for the most successful prosecution of his calling, that he should be acquainted with the general principles of the composition and growth of plants, of the food necessary for their more perfect growth, and of the easiest and most practicable manner of obtaining this plant food; that he should have an intelligent knowledge of the proper time and manner of applying it to the plant, and of the simple natural laws which govern vegetable life; that he should be able to give an intelligent reason for the faith that is in him, when he tells you that one kind of food is more profitable than another for fattening purposes, or that a particular course of care and feeding is better calculated for milk production than another. This much is,

I think, within the reach of every intelligent farmer who is able to read, and who has a desire to acquaint himself with the principles which underlie the successful prosecution of his profession. You may call this if you please by the terrible name of "Science," which is such a bugbear to many, but it is after all but a slight acquaintance with the plain and easily discoverable natural laws whose operations are daily going on before his very eyes, if he will but open them a little more widely to perceive them.

It is a lamentable fact that even in our own country, up to a comparatively recent date, the commonly received idea was that the farmer's calling required but very little education, and the tendency has ever been, and to a great extent now is, to educate boys away from the farm. In the school readers, boys were encouragingly told of the young man who toiled early and late at his books in order that he might win the prize scholarship in college, and so rise to something more honorable than "raising turnips and selling fat cattle," as the school book complacently phrased it. And in fact nearly all the pretty stories which are put into the hands of our children in Sunday school books and in juvenile periodicals contain this same moral, "Be good boys, study hard, send all your coppers to the heathen, and some day you will be fortunate enough to leave the old farm and take a proud position in some calling where your hands can be kept soft and your garments untarnished by contact with the filthy soil." One of the leading juvenile periodicals of the day tells a very interesting story of a lawyer who re-visits the old farm where his boyhood was passed, and there finds an orphan boy whom the old folks have kindly taken from some charitable institution. Finding him bright and intelligent, he gives him a pocket dictionary and encourages him to try and get an education, telling the boy with great unction that if *he* had not studied hard and acquired an education he might now be plowing on the old farm. The moral, though not attached to the story in so many words, is "'*Haec fabula docet*,' get an education so as to rise from the farm and be a lawyer." I do not wish to be understood here as desiring in the slightest degree to cast a fling at the learned professions. That would, indeed, be as silly as the other extreme which I am endeavoring to decry. But what I wish to speak against and to write against here and at all times, is the idea that an education must necessarily transplant a boy from

the farm to something which he is taught to regard as more honorable and less laborious.

I wish to speak against the practice of holding up to the farmers' boys, as the highest incentive to encourage them in their studies, the bright vision that they may one day be able to turn their backs upon the old farm and all its occupations and surroundings as something beneath the dignity of an educated man. This has unmistakably been the tendency in the past, and is so to too great an extent at the present time, and this it is that has crowded the learned professions to repletion, so that to-day you can find many men with soft hands and soft muscles, men who can talk learnedly of evolution and of protoplasm, and who can read the testament in the original Greek, who are engaged in the most servile occupations for their daily bread. What, then, is the other alternative? Is it to keep farmers' sons in ignorance and to allow them to grow up devoid of all mental culture and development? Most decidedly not. Rather multiply in every way the advantages for a thorough education to the farmer's son and daughter. Encourage them by all means to study and to acquire as ripe intellectual culture as possible; but let the main incentive be to rise *in* their calling and not necessarily to rise *from* it. Let their education point out to them that in the calling of the farmer there is a range of problems that is fitted to call out all the grandest powers and efforts of the human mind, and that to understand and practically demonstrate them, is as noble a pursuit as is the measuring of the planets or the tracing of the heavenly bodies in their courses. And I claim that he who, by patient and intelligent study and experiment, has given to the world a new and valuable cereal, or an improved or more excellent tuber, has benefited his race as much as he who has discovered an asteroid. Let the farmer's son be taught that there is, at least, as much opportunity to rise in his profession as in any other. Let him understand that in no pursuit can brains be turned to better account than in agriculture. The earth yields her fruit after its kind and in obedience to fixed laws, and the study and application of these laws, or rather the understanding of the conditions which shall bring our work into harmony with these laws, is sufficient to occupy the grandest intellect, and to employ all the powers and faculties of the mightiest mind.

Now, to come to another point: How are farmers, who have not had the advantage of a thorough education in their youth, to attain to an advanced standard of intellectual culture, as regards matters pertaining to their own profession? As one great and important aid in this direction, I would mention the *Agricultural Journal.* Every farmer should take and read some first-class, reliable, well-conducted agricultural paper. Don't say you can't afford it. My dear sir, you can't afford to do without it. I consider the farm journal, or newspaper as we call it, one of the most valuable educators of the day, and the money expended for it will be repaid ten-fold in the knowledge which may be derived from it, if put to practical use. It is not alone necessary that he should take it, but that he should read it carefully, and put to the test, as far as practicable, such ideas as he may gain from its columns. He will find there recorded many experiments made by practical men, and the results of those experiments as affecting the growth of crops or the care and breeding of animals, and from these he may gain many valuable hints which will be of much service to him, if remembered and acted upon. While I would not have the farmer ready to be carried away by every new wind of doctrine, or eager to embrace every new-fangled notion because he happened to read it in his paper, yet I think we are most of us too conservative as regards our manner of farming, too apt to think our own way right because we have always been in the habit of practising that way, and too little disposed to study into the why and wherefore of the matter to see if a course entirely different from that which we have been pursuing would not be attended with far better results. Absolute knowledge is unattainable, and that which in one generation may be right, and may be the best method, will, in all probability, be shown by the advanced attainments of the next, to be imperfect and not best adapted to the object in view. This is progress, and the farmer should seek to keep abreast of the advanced thought of the age in which he lives, instead of clinging blindly to the old way because it was at one time the best known method.

Another most important help in this direction is the careful study of reliable works upon agricultural subjects. The systematic study of one such work during a part of the leisure hours of a single winter would be of incalculable benefit to any farmer, and he would thereby obtain a rich fund of knowledge to aid him the more intelligently to conduct his future operations. Works of this kind

are plentiful and are within the reach of all. They need not be the bulky, abstruse tome, calculated for the use of the professional scientist, but they can be had in concise form and written in simple language which all can understand; and the perusal of these will open out to the mind of the farmer who has never before made himself acquainted with them, a new world of facts and ideas which he never even dreamed of; ideas and facts, too, of which he can make practical use in his every-day operations. Too many of us are apt to think that the facts of science are not practicable, that they are only suitable for the laboratory and for the study of the professor, and are not of a nature to enter into our every-day operations. Many a man who would scarce own a mowing machine a day without taking it apart and learning its composition and the particular arrangements of all its parts, and what course it was necessary to pursue in order to put it in successful operation, what parts should be oiled in order to prevent excessive friction, and so acquainting himself with all its workings, would at the same time consider it a matter far beyond his reach to learn the component parts of the soil he cultivates, or of the plants he wishes to produce, and the time, place and manner of applying the necessary lubrication. Yet the one is to a certain extent as much within his reach as the other, and as needful for the intelligent and successful conduct of his farming operations. I know that there are those who will say that they would rather have the benefit of the experience of one good old common sense farmer than all the "book larnin'" in the world. But supposing this same farmer had had the benefit of this intellectual culture of which I speak to supplement his sound common sense, and aid him in gaining experience, who will deny that he could have carried on his operations much more intelligently and successfully? I am well aware that no man can gain a thorough knowledge of farming from books without the aid of experience and a practical acquaintance with the business. The man who would undertake to farm in this way might possibly find himself in a like predicament with the young man who, though never having been at sea, studied navigation, and then attempted to sail one of his father's ships across the ocean. A storm coming up, he rushed to his book to find the necessary orders for taking in sail. Having given off one or two orders as the book directed, he turned over two leaves by mistake and "dumped his killick" in mid-ocean. In turning too many leaves he had hit upon the direction for coming to anchor in port.

It is one of the most encouraging signs of the times for farmers, that this old-time prejudice against what was called "book farming" is fast dying out, and that the more intelligent class of farmers are coming to understand and appreciate the fact that the culture of the soil is not a blind chance affair, dependent wholly upon a man's luck and Nature's generosity, but that it is governed to a great extent by fixed principles, a knowledge of which is not only possible but necessary in order to enable a man to cultivate his acres with any certainty of a successful result. Again, to the habit of reading agricultural papers, and studying works upon agricultural topics, the farmer must join the habit of *thinking*, which is the master key to true intellectual culture and attainments. Without this his reading may be but a chaotic, undigested mass, without form and void, as far as any practical results are concerned.

Remember that cramming is not education, and that the true purpose of intellectual culture is to teach men and women to think and reason. A man may have a mind stored with facts and formulæ blindly committed to memory, and yet, if he be not trained to *think*, he is but a walking dictionary or an animated encyclopedia. It is not the amount a man eats that makes him strong and healthy, but what his system digests and assimilates. So it is not the number of pages a man reads that will make him intellectually strong and vigorous, but what he remembers, thinks upon, and makes wholly his own.

The next great help to improvement in intellectual culture among farmers which I shall name in this connection, is the grange, or, if this is not at hand, the farmers' club—the meeting together of farmers each week, or at such other stated intervals as may be convenient, for the purpose of discussing questions pertaining to agriculture and the interests of farmers generally. This I consider as a most important aid, and one which too many farmers fail to appreciate at its true value, and whose advantages they fail to avail themselves of as is their right and duty. The questions brought forward for discussion at such meetings have a tendency to set men to thinking, and though one effect of this may be to show us how little we really know of the principles which underlie our profession, which is at first thought rather humiliating, still it is, on the whole, most salutary, as it begets a desire for study and research, and so opens the way to greater intellectual attainments in this direction.

I consider it a duty which every farmer owes to himself and to the noble calling in which he is engaged, to unite with some grange or other farmers' association, and thus put himself in the way of receiving the great benefits which may come to him in enlarged views of the dignity of his occupation, and of the importance of fitting himself, in every possible way, for carrying it on more intel ligently, and for that reason, more successfully.

How many farmers there are who are to-day capable of addressing this meeting upon topics connected with agriculture, with credit to themselves, and with interest and profit to their hearers, who got their first start towards whatever of intellectual culture they have gained in this direction, in the farmers' club or grange meeting! It is this friction of one mind upon another which calls forth ideas, and sets men to thinking and studying upon matters in which they are most directly interested. I have no hesitation in saying that any farmer who shall, during this winter, regularly attend the meetings of any good live grange, who shall take part in its discussions, and enter heartily into its work, will acknowledge that he has been repaid ten-fold for all his time and trouble of attendance, in the ideas gained, and in his increased appreciation of intellectual effort, and of joining mental to manual labor in carrying on his farming operations.

I have, thus far, considered this subject only as pertaining to matters having a direct relation to the farmer's calling, and have endeavored briefly to present the importance of intellectual culture as pertaining to the principles of agriculture, and to the correct and intelligent manner of applying those principles so that they may become of practical benefit. But we must remember that we are not only farmers, but we are American citizens; citizens of this free and noble country where the will of the people is the law of the land, and as such we have important duties and high and noble opportunities. From our numbers we have it in our power largely to direct the current of thought in our country, and to influence the character of its institutions and of its civilization. There are many matters which have no direct bearing upon his particular vocation, in which the farmer has a right to be interested, and which present to him rich fields for investigation and research, and thereby for mental improvement and culture, if he have but the will and the desire to enter upon them. This is pre-eminently an age of intel-

lectual activity and careful, thoughtful investigation. At no time since man began to think, were there so many strong minds and vigorous intellects at work as at the present day. The old notion of accepting everything as truth, merely because our fathers and grandfathers believed it to be so, is passing away, and men are coming more and more to think for themselves, and to examine for themselves the evidences of the truth or falsity of presented theories relating to all the phenomena of nature. Time was when only the select few were educated to any extent, and the masses kept in gross ignorance; when the few did the thinking for the many, who received all ideas at second-hand, and accepted them blindly as truth, if only they bore the stamp of the approbation of the so-called wise men. Ignorance ever begets superstition, and the minds of men accustomed never to think and investigate for themselves are necessarily governed by blind prejudice and a servile acceptation of all ideas from their intellectual superiors. It is the province of intellectual culture to raise men from this condition of mental servitude, to break the shackles of superstition and prejudice, to place them upon a broader, freer and more independent plane, and to teach them to think, examine and investigate for themselves. The fears sometimes expressed that this spirit of investigation may be carried too far, may beget doubt and skepticism, and thus work harm to society are, I think, wholly groundless and contrary to our republican ideas of self government. However dear and time-honored may be our notions and ideas relating to any department of life, if they will not bear the light of keen scrutiny, and stand before the evidence of accumulated facts, we should be willing to conquer our prejudices in their favor, to discard them as erroneous, and freely and gladly accept that which more enlightened reason and more recently discovered facts pronounce to be true. The old notion that the earth was flat was one to which men clung with rigid tenacity, and the contrary opinion was considered as a daring and dangerous innovation upon existing belief. It could not be true because generations of men, from time immemorial, had believed to the contrary. But when, to prove the truth of their intellectual research, the test of practical experiment was resorted to, and men approached the east by sailing to the west, the old ideas, sacred and time-honored as they had become, had to be discarded and the new theory accepted as truth.

So in relation to the theory of the revolution of the earth. Here was a theory which was to upset at once all the old notions and beliefs concerning natural phenomena; a theory which was dangerous and intolerable, and the superstitious prejudice of the age declared that it must be stamped out at once. Old Galileo, who had the hardihood to promulgate the new and startling idea, was seized and cast into prison as a teacher of corrupt and dangerous doctrines, and in order to save his life was forced to sign a formal recantation denying the truth of his theory. But the muttered words of the old philosopher as he re-crossed his prison threshold have become the motto of the ages, "The earth moves still." Superstition and ignorance may persecute truth, but they cannot crush it out. It will live and flourish though it have to struggle for existence through prison bars, and will shine in triumph above the light of the fagot and of the stake. A more enlightened and more generally diffused intellectual culture serves to free men's minds from this weight of gross superstition which is ever the handmaid of ignorance, and to prepare them for the reception of new truths, however startling in their character, and however much they may conflict with existing ideas and preconceived opinions; and an educated and cultured people are not disposed blindly to reject any new idea merely because it conflicts with the old, but to examine its merits fairly, to weigh the evidence for and against its truth, and accept or reject it according as it is able to stand the test of careful and enlightened investigation. The world owes much to its doubters, for they have ever been the pioneers of advanced thought in every department, and have helped to lead the world on to whatever of perfection it has attained in the comprehension of all the problems of life. There is nothing to fear from the free expression of ideas, even though they be erroneous. Truth is eternal and can take care of itself. If any man, therefore, feels an idea burning in his soul and struggling for utterance, let him give it to the world, no matter how directly it may be opposed to existing tenets or time-hallowed opinions; being assured that if it have the elements of truth in it, it will live and grow in spite of opposition, and be a blessing to mankind; but if it be an error, it will fall to the ground and be obscured in the greater light of the living truth.

The world of intellect has need of its pioneers as well as the natural world, and though we be not always prepared to follow them to their full extent, yet if their ideas prove to bear the impress of truth, we

are gradually educated up to them, and the notions termed extremely radical a generation ago would to-day be deemed conservative, to say the least, and in time we come to wonder how we ever doubted them. The world has far less to fear from the radical ideas of advanced thinkers than it has from the ignorance and mental degradation of the masses, for if men become able, by education and intellectual culture, to examine and consider facts and theories for themselves, there will be little danger of unsound and erroneous principles gaining ground to any considerable extent. For this reason I would plead for a more advanced standard, and more general diffusion of education and culture among the farming class. They are the solid stay and support of the body politic, the class upon which all other departments and professions depend for subsistence, and no nation whose farmers are, as a class, sunk in the dark mine of ignorance and superstition can in the true sense of the word be called an educated nation. Such a people are, from their very constitution and composition, incapable of enjoying or maintaining the institutions of a free government, and are fit only to be ruled by a monarch, or to bow the servile knee to a despot's will. Free institutions can only exist and endure among an enlightened and educated people, while tyranny and despotism flourish best in an atmosphere of ignorance and mental degradation. Our forefathers wisely recognized this fact, and early established colleges and institutions of learning, and took measures to encourage the diffusion of knowledge among the masses, and to-day the strength of our republican institutions rests upon the honest intelligence of the people. The former slave-holders of the South also understood it, and with a consistency born of sordid self-interest and a determination to be the ruling class, made it a penal offence to teach a slave to read. How long, think you, would three millions of people have consented to bear the degrading yoke of slavery had they been educated and had the benefit of the enlightening and elevating influences of intellectual culture? It is gross ignorance that keeps men and women in a condition of servitude, and to-day, for this very reason, the laboring classes of the old world are to a great extent in a condition of slavery little less abject than that of the negroes of the South under the old regime. Let education be generally diffused among the farmers of any nation, train their minds to think and investigate for themselves, and comparative freedom from tyranny and despotism will be sure to follow. In our own land where partisan strife runs so high at times, and

where timid croakers would often have us believe that the politicians of one party or the other are fast running the old ship of State on the rocks of anarchy and misrule, yet with the large body of the farmers taught to read and to think, they can safely hold the balance of power, and with ballot in hand prevent all encroachments upon the liberties of the people, and place men at the helm who shall in times of danger guide the old craft into smoother waters and less troubled seas.

Closely allied with this matter of intellectual culture, and one that will be sure to follow it to a greater or less extent, is that of social culture and refinement. It is the idea of many people that because the farmer has to do with the rough and rugged work of tilling the soil and of reclaiming the mighty forest from a wilderness to a state of cultivation, his manners must necessarily be rough, boorish and uncouth, and that his home must be destitute of all social refinement and cultivated taste. That this is true to too great an extent in many agricultural districts cannot be denied, but that the nature of the farmer's occupation renders it necessary is, I think, incapable of proof, and I see no reason why the farmer should of necessity be a boor or an ignorant clown because his hands are rough and hardened by contact with the plow and the hoe, or begrimed from the black logs of the chopping. That there is a great improvement among farmers in this respect is very evident, and as schools, newspapers, printed books, and all the various means of education are being diffused more generally and made more easy of access farmers, as a class, are gradually but surely rising to a higher plane of intellectual and social culture and refinement. One great thing necessary to the farmer in this direction is that he own his home. No landlord system should ever be allowed to gain a footing in this free land. The consciousness of being the undisputed owner of a portion of the earth we inhabit, brings with it a feeling of independence and a sense of dignity that can never be possessed by him who cultivates another's acres. There accompanies this ownership of the soil a feeling that whatever one does for its cultivation and improvement, he is doing for the benefit of himself and his family; and that although he may receive no immediate return in dollars and cents, and though he may not live to enjoy the full benefit of all these improvements himself, yet he feels that they will be a blessing and source of comfort and profit to his posterity, and an enduring monument to his memory.

Having gained a home of his own, the next duty of the farmer is to render that home as beautiful and attractive as possible. It is not expected that he can have the elegant furniture, costly carpets and rich surroundings which only great wealth can afford, nor are these necessary to true social culture and refinement. But there are many ways in which the man of limited means can add to the comfort and beauty of his home, and furnish it with those simple adornments which exert such a refining and elevating influence upon the minds and manners of its inmates. Instead of regarding his house as merely a place of shelter from the inclemency of the weather, as the Indian does his wigwam, or the wandering Arab his tent, he should strive to make it a home in the true sense of the word, a place fit for a civilized, cultivated man and woman to dwell in; one in which he and his wife and children can enjoy peace and comfort and true social happiness while abiding in it, and to which their minds will revert with tender recollections and anxious yearnings when absent from it. Who has not experienced the chilling, dreary, homesick feeling which comes over one who enters upon the premises of the farmer who pays no attention to any of these things? Without, there is no attempt at adornment, often not even of cleanliness; not a tree or shrub or cultivated flower to relieve the monotony or to add beauty to the landscape. Within, not a book or paper, not a plant or vine, or any of those little accessories which cultivated taste will suggest and even the most limited means can provide.

These things are generally a key to the character of the inmates, and we may naturally expect to find the dwellers in such a home, if home it may be called, rough and uncouth, wholly uncultivated in their manners and lacking in all those simple little amenities of language and social intercourse which render domestic life so much more agreeable. How different the feeling when we enter the dwelling which a cultivated taste and love of refinement have contributed to render pleasant and enjoyable. Simple though these homes may be, and wholly devoid of that vulgar attempt at mere display which, by the way, is the other extreme of the want of culture, there is an air of home feeling, of true and refined domestic comfort about the premises which at once sends a cheerful ray of sunlight to the heart of the visitor. Books and papers are upon the shelves and stands. Plants are placed at the windows and in convenient nooks about the rooms. Pictures and other simple though attractive works of art adorn the walls, and if the means of the owner will allow,

the musical instrument is introduced to add its charm and to exert its educating and refining influence upon the minds and hearts of the whole household. How different the manners of a family living in the midst of such surroundings, both in their intercourse with each other and with those with whom they are brought in contact. Upon entering a home like this we instinctively pay to the master of the house the respectful homage due to a cultured gentleman though he be clad in hodden gray, and acknowledge the mistress to be a lady though she be attired in a six-penny print. It is a home like this that makes a young man, as he grows up, contented to remain at home on the old farm, or to make another like it for himself when the old hive gets too full. He sees that there is something in farm life besides mere drudgery and toil, and finds that it is possible upon the farm to surround himself with many of those things which are so desirable to a man or woman of any degree of intelligence or refinement. On the contrary, a young man brought up in a home where all these things are lacking, as he comes to man's estate and begins to think and act for himself, naturally regards life upon the farm as a mere round of irksome toil, with nothing about it to satisfy the finer feelings of his nature or to develop the nobler qualities of the soul. What wonder that he should have a distaste for the business, and wander away from the home of his childhood in search of other and more congenial pursuits. Perhaps some may say that all these things are very well if we were only able to have them. If we were but rich, we would adorn our homes and make fine grounds about our dwellings, and purchase libraries and music and all these things, but poor farmers must be content to delve for a living and leave all such luxuries to other and more favored callings. Here is where the great mistake is made. Suppose you should become suddenly wealthy, and should go and purchase a large library of rare and costly books at once. Ten to one if you ever looked into them or made yourself acquainted with one of them. It is the gradual gathering together of these things which brings the true pleasure with it, and helps to educate and refine. Should you become able, all at once, to buy costly furniture and rich adornments for your home, you would not prize them or appreciate them as you would to gradually grow into them, as it were, and to supply simpler and less costly articles to answer the same purpose as you become aware of your need of them. A commencement in this direction however small is what gives a desire for more. Purchase a few good books

and read and study them carefully, and you will then probably desire some other or more advanced work upon the same or kindred topics, which you will usually find means to procure, and as you add little by little to your stock, as you feel the need of them, you will in a few years have a valuable collection, and will have improved your mind and taste to a vast extent. It is just so with the adornment of your grounds and other surroundings. It need not be costly nor fitted for display, but it is the *doing it*, little by little as you have time and opportunity, which brings with it the pleasure and the increased degree of culture and refinement.

It may be said that this is all unnecessary and wholly superfluous, and that many farmers have made a comfortable living for themselves and their families without any of these things, and that we can do it now as well as they. This is very true if we consider only the question of mere subsistence and shelter, which is of course the prime necessity, but a necessity which man shares with the brute creation. Life means something, or if we rightly appreciate and interpret it, it should mean something more than three meals a day and a roof over one's head. Man has higher and nobler faculties which are capable of being educated and cultivated, and which it is both his right and duty to make the most of. It is a more extended appreciation of these facts, and a more general attention to them, that is to raise farmers to a still higher level and to fit them for that position in society which it is their privilege and duty to occupy; and we hail it as one of the encouraging signs of the times that they are, as a class, awakening more and more to a realizing sense of the importance of this fact, and are taking measures for improvement in intelluctual culture and in social and domestic refinement. Waste no time then in trying to convince yourselves that you are not disgraced or lowered in the social scale by your calling. If any such thoughts as these bother you, be assured that the fault is in yourself and not in your occupation, and that you have not yet arrived at the correct idea of true manhood. Be a man *in* your calling and your calling will help your manhood. And, let me say right here, that the trouble with too many farmers is that they regard their work as irksome toil, and as a kind of drudgery to which they are subjected by the force of circumstances and by a hard and unkind fate, and as a menial occupation from which they would gladly escape if they could and rise to some higher and more honorable pursuit. They follow farming not because they would, but because

they must, having no love for it, or enthusiasm about it, and ever hoping, like Micawber, that something will "turn up" to release them from it as from a tiresome bondage. No man can succeed either as a man or as a farmer, who looks thus upon his calling. The farmer, of all men, should be intensely interested in his work. If he sees in it nothing but weary toil from day to day, nothing but unremitted drudgery, in which he has little interest and for which he feels himself but poorly recompensed, he is most truly little better than a slave. But if he pursues his work from an ardent love of it, if with each returning sun the earth looks glad to him and he is eager to resume his work where he left it the night before, his labor though toilsome will not be irksome, and instead of being sour and crabbed and ill at ease, his merry whistle or glad song, as he goes about his daily work, will bear willing witness to the joy and happiness that is in his heart. The true farmer will look upon his farming as his life work, and not as a mere temporary makeshift to be abandoned as soon as something else may offer itself as a means of support. In this view he directs his operations not wholly in reference to their results for the present year, but he looks far ahead and calculates how the course he is to pursue will affect him and his farm for years to come. His farm is his home. Here he hopes to spend all his days, and he directs all his efforts to the work of improving it and making it easier of culture and more productive of the fruits of the earth. Every stubborn old stump that he removes, every unsightly stone that he digs up is so much done for himself, and so much added to the inheritance of his children. His farm becomes, so to speak, a part of himself. Every nook and corner of it is familiar to him. He has trodden upon every foot of its soil and knows it all. He feels a sort of glad and joyous pride as he roams over it and thinks that it is his, and that upon it he has expended the best of his thought and the vigor of his muscle. In the glad spring time, when he turns over the rich mellow furrows with his plow, the earth looks sweet to him, and smiles upon him like a nourishing mother from whose bosom he is to draw his sustenance and support. And in the mellow autumn days the ripe grain nods its golden head approvingly at his approach, as if to thank him for his labor and encourage him in his toil. And when the harvest is over and the barns are filled with the fruits of his husbandry, as he joyfully follows the last generous load of golden sheaves from the fields, how merrily he sings the "Harvest Home," and how his

heart swells with gratitude to the good Father who has so bountifully rewarded him for his faithful labor. It seems to me impossible for the true, earnest, zealous farmer to be a mean and sordid man. He is brought so much in contact with Nature that if he will but put himself in sympathy with her, his heart and soul must grow and expand, and be so filled with honest thoughts and generous impulses as to leave no room for meanness or littleness. The true husbandman sees in all the many and various processes of Nature something grand, elevating and ennobling. As he studies into these various processes and tries as well as he can to discover the reason for them, and to trace the relation between cause and effect; as he experiments in various ways and eagerly watches the results of those experiments, he becomes more and more interested in his work, and by its generous influence he can but become a large-hearted, whole-souled man.

To sum up, brother farmers, let me say that our future as an intelligent, educated, cultivated class is in our own hands. It is folly, nor have we time to waste for the purpose, to discuss the question of what should be our social status, or our rightful position in society. That is a matter which with us as with any other class of citizens will take care of itself. No particular place, or grade, or rank, in this free country, belongs by right to any man unless he is fitted and prepared to assume and maintain it. Let us then take measures the more thoroughly to educate ourselves, and to advance the standard of intellectual culture among farmers, and thereby gain that advanced position which is the right of every man who is prepared to occupy it. The time has gone by when farmers could sit with enraptured ear and hear some wasp-waisted, taper-fingered, theological student, with no more muscle than a toadstool, and who would faint at the sight of a manure heap, discourse eloquently upon the dignity of labor and the honorable position which farmers occupy, and air his dictionary and ventilate his salad sentimentalism upon the beauties and the charming romance of country life upon the farm. It is out of date in these days for Squire A. or Doctor B. to strut into an assembly of farmers and with a patronizing, condescending air inform them that they are just as good as anybody, if they will only behave as well. Men are now less than ever before measured by the fineness of the clothes they wear, or the amount of money they may have in their pockets. Rank and wealth and fine

clothes are all right as far as they go, but remember "the man's the man for a' that."

True manhood may and very often does exist among the ignorant and unlettered, but educated manhood is of much more satisfaction to the possessor, and a far greater blessing to the world. What we as farmers want is educated muscle. Men with hardened hands and active, cultivated brains. Men who are not afraid to work, but who are able to work intelligently and to apply muscle where it will do the most good. We are making an encouraging, healthy advance in this direction. Farmers to-day are reading and studying more than ever before. Agricultural colleges are being instituted all over the land, and greatly increased attention is being paid to intelligent, thoughtful agriculture. And the man who sneers at intellectual attainments as applied to farming operations will soon find himself left far behind in the race, and we shall see him, some fine morning, waking up, rubbing his eyes and looking around, and wondering how his neighbors got so far ahead of him.

Let us, then, embrace every means and every opportunity of improvement in this respect, to the end that here in this good old State of Maine, for which Nature has done so much, we may have better farms, better crops, better stock, better men and women, and better homes.

WALDO COUNTY.

Institute at Waldo.

An Institute in Waldo County was held at Ritchie Grange Hall, in the town of Waldo, February 19. The day was cold and the travelling bad, yet a large gathering of farmers were present from the surrounding towns, who highly appreciated the privileges of an Institute. A generous hospitality was tendered to all the members of the Board present, and to the visitors from abroad.

The Importance of Stock on the Farm was the subject of the day. An excellent paper upon the subject was read by the local member, D. B. Johnson, who was followed by the member from York, on the

Profits of Feeding Steers. In the afternoon a discussion on What the Dairy Promises filled up the time. In the evening W. P. Atherton of Hallowell read a paper on the subject, Fruits for Waldo County, and the President of the Board, Edward Wiggin, read a paper on the subject, Familiar Science on the Farm. In all respects the Institute was most successful and satisfactory.

YORK COUNTY.

Institute at Saco.

An Institute for York County was held at Grand Army Hall, Saco, March 18. There was a large and enthusiastic gathering, assembled from a wide circle of towns. A good choir furnished music for the occasion. The Saco Grange furnished refreshments at their hall near to the place of meeting.

After singing by the choir, J. M. Deering, member of the Board for the county, called the meeting to order with the following introductory remarks:

INTRODUCTION.

BY J. M. DEERING.

This is the farmers' meeting, and as we look about us we see quite a large number assembled here, which is good evidence that we have assembled for a purpose. The question might arise, For what purpose? I will answer by saying that we have assembled to discuss matters pertaining to our own interest. The farmer's interests are the basis of the prosperity of all other material interests. What would be the use of our stupendous railroad systems if it were not for the farm and the farmer? All those who are engaged and interested in this industry are continually coming into contact with questions of doubt as to whether this operation or that will prove to be a success or a failure, and as the Yankee farmer is an inquisitive being, he is continually asking questions that cannot always be answered satisfactorily to all parties concerned, and as we have occasionally been asked the question, What does it cost to raise a

pound of beef? and also, What does it cost to produce a pound of butter? and as we have been unable to answer these questions satisfactorily to all parties concerned, we have appealed to some gentlemen in another part of our State, gentlemen who are practical farmers themselves, to help us out of our dilemma by answering the question, What does it cost to raise a ton of hay? I consider this question to be of greater importance than any other that could be placed before the farmers of York County to-day for discussion, and as these gentlemen have responded to our appeal, and come willingly to our rescue, I will call upon George H. Boothby to welcome them in behalf of all those whom it may concern.

ADDRESS OF WELCOME.

By Geo. H. Boothby, Master Saco Grange.

Mr. Chairman and Gentlemen of the Board of Agriculture:

It becomes my pleasant duty this morning, in behalf of Saco Grange, and of farmers in this part of York County, to extend to you a cordial, hearty and earnest welcome. We have looked forward to this meeting with cheerful anticipations, because we should have the privilege of greeting the members of the Board personally, because we believed that the meeting would result in giving to us new and practical ideas that would be of benefit to us in our farm operations.

We have invited you to a county not particularly remarkable for the natural fertility of its soil, nor have you come to an unfruitful, barren, desolate soil.

The soil of York County is, on the whole, well adapted to farming, and in the years that are past has responded to the labors of the husbandman by yielding good crops. The land that our fathers tilled was comparatively new and rich. They had only to sow in order to reap. Each year the soil responded bountifully to the demands that were made, because it possessed the qualities necessary to produce those crops, and so they continued to take from the willing land, without realizing or believing that much brain labor, science or skill was needed in their vocation. But at last it was found that at each year the harvest was a little less than in the preceding year, till to-day we find the condition of too many farms in our county is, that there has been taken from the soil those elements

that are needed to make vegetation flourishing, without returning a fair equivalent. Now, under these circumstances, in this dilemma, something must be done. Like the sailor in the storm, who prayed first to God, and then to the devil, for he said he "didn't know whose hands he should fall into," we too have been sailing on the sea of doubt and uncertainty too long already.

We have come to see the necessity for studying the nature and character of the soil we till, to seek after and profit by the experience of the successful, progressive farmer, to receive knowledge from whatever source we can, so that to-day we are in a condition to be anxious for just such instruction as you will be pleased to give us.

It is no use to disguise the fact that it is a necessity to bring farmers to their books. And it is also true that those who need instruction and the benefits of these discussions the most are the last to avail themselves of the opportunity afforded to-day.

Without attempting to deliver any eulogy upon the farmers of this section of our county, it is fair and just to say that we have many progressive farmers who have abandoned the old ruts, and by associating brain labor with manual labor are making farming a success. You will find many of this class here to-day, searching for information, and also in possession of experience that may be of value in discussing questions that will be presented.

And now, gentlemen, without occupying more of the time, I will only say that the seed that you sow to-day will be "received in good and honest hearts." The instruction that you give will be appreciated, coming as it will from men whose experience and study has proved so valuable to farmers all over our State.

As farmers, as grangers, as citizens, we extend to you a cordial welcome.

Z. A. GILBERT, Secretary of the Board:

Mr. President, and Ladies and Gentlemen:—The welcome which we have listened to certainly should not be allowed to pass by without recognition, and it seems to devolve upon me to express a word of appreciation of the fact that our welcome is not worn out among the farmers of this State, and I assure you that we appreciate the fact as here expressed, that we are welcome to these farmers in this vicinity.

We hope, too, that our presence here on this occasion may be of advantage to these farmers. We endeavor to come before a gather-

ing of farmers with instructions that may be followed with safety. It is quite a difficult thing to be progressive and at the same time so cautious as not to be extremists. It is a difficult matter to know just where the line between safe practice and theory lies. While we aim to be safe advisers, at the same time it is demanded of us that we be progressive. The Board of Agriculture has in this direction a good record. If you look over the volumes which contain a record of its work in the last twenty-five years, you will find that the Board, through its members, has been the early advocate of every measure which has stood the test of practice up to the present time and has been established as the best practice of the day. They have been the advocates and real promulgators of these progressive steps. Further than that, I believe that in all that time they have not run wild on any new scheme, any new measure, or any new practice; and that they have not been obliged to take a back step or erase any of their work. So I think, after these twenty-five years, that we may say that the Board of Agriculture has been a safe body of advisers. Agricultural thought is alive; it is awake; it is active; and wherever there is thought at work progress is being made. The best practices and the best methods are being introduced, of course first through the more intelligent and earnest farmers, and from them gradually accepted by their neighbors, until finally the whole community is reached.

Our purpose here to-day is to encourage that thought, to keep the spirit of progress alive and at work, that a greater prosperity may arise from a more correct appreciation of the problems under consideration. We can only consider a few points at any one meeting. It is better to do a little and do it well than to scatter efforts over too much and thus lose force.

The subject here to-day, as was said by your member of the Board, is an important one. There is altogether too much guess work in farming. There is altogether too much of indefinite ideas as to where profits and losses arise, or whether there is any profit. Farmers go on with their business, make it profitable, get rich and die, without knowing how they did it, or where their property came from. The more we know about our business the better we may be able to control it, and the more likely we shall be to shape it into those channels which shall bring the best results. If we are to know which our most profitable crops are, we want to know what the cost of those crops is, to begin with. If a crop cost more than we can

get for it, then it cannot be a profitable one. We have met here to-day to consider the cost of a ton of hay.

So, without detaining you longer, I wish to say again that the Board appreciates fully your presence here and your welcome at this time. We know that here are present the active, wide awake, enterprising farmers of the community, just the men we want to meet, and we are glad to meet you here.

COST OF A TON OF HAY WHEN GROWN FOR SALE.

By R. W. Murch of Hampden.

It is very remarkable that the leading crop of Maine, the crop of crops, and the one upon which all other crops almost entirely depend, has received so little consideration from a stand-point of cost of production. It is more remarkable still that farmers all over the State have been selling a production all their lives without any definite knowledge as to its cost. The preparation of the ground to produce it, interest and tax, are left almost entirely out of the account, and it generally is reckoned at only a little more than double the cost of cutting. So we conclude, when hay is sold from ten to fifteen, or sixteen dollars a ton, there is a large margin of profit. If you buy a ton of hay for ten dollars and sell it for twelve, there is a basis to work from; and, after deducting expenses, if any, you can easily ascertain what has been made.

This matter, however, of figuring out the cost of producing a ton of hay is really a difficult problem. There are so many variable conditions beyond our control, that when one attempts to figure it out, he is beset with numerous difficulties which preclude the possibility of arriving at fully satisfactory results. The character of the soil, the quantity and quality of the dressing; the seasons, wet and dry; the former acting upon the soil so as to increase the crop, the latter affecting it in the opposite direction; the freezings and thawings of early spring and late autumn; the length of winter and the amount of snow. An open winter—that is, when our grass fields are not protected by snow, is very injurious to grass roots. If they are well protected by snow, little or no injury is sustained. All these conditions are factors entering into and affecting the hay crop to a greater or less extent. So we see the subject is surrounded with difficulties at the outset, difficulties which cannot be eliminated, and if the cost should be reckoned from each year it would vary

greatly. It can only be approximated at the best; and this must be done by taking an average through a series of years.

I cannot undertake to treat this subject from a scientific standpoint, for the very best of reasons. I have no special knowledge of chemistry.

But there must be a starting point and an objective point, a basis to work from and an object to reach. In selecting a basis, I shall not surround it with the most favorable conditions, as many are apt to do when they want to make a good showing; neither shall I hamper it with adverse conditions, but shall endeavor to treat the subject with fairness and without going to either extreme. Just here I want to say that three-fourths, and perhaps it would not be too much to say, seven-eighths of the farmers will be greatly disappointed in the cost of raising a ton of hay. Having never considered the subject in detail, they are at loss to understand how it can cost so much. But examine it from whatever point you may, if it be a fair one, the result will always come out larger than farmers are generally willing to accept.

In the following discussion, no allowance is made for the variations of the seasons, as affecting the crop; they are all supposed to run alike. It is further understood that the removal of the crop the last year also removes the last of the fertilizers applied at the first; that the ground is left in just the same condition that it was five or six years before, when the dressing was applied necessary to produce these several crops of hay.

Now I want you to bear with me while I read so much of an article as relates to the cost of raising hay, which I wrote two or three months ago. Some of you have already read it, but it will do no harm to call attention to it again. I want to read this because it gives about as fair an analysis as I can present, and does not make an unreasonable showing.

In the following examination of the cost of producing a ton of hay, I may differ with some, a dollar or two on a ton; but this discrepancy may be accounted for by difference in soil and difference in location, which may affect the value of land, and incidental costs.

The average production of hay in Maine will not vary much from one ton per acre; and to produce six tons of hay on an acre of land in as many years—annual average of one ton per acre—there will be required at the outset an expenditure in manure and labor

applying it, of at least twenty dollars. There will be required a further expenditure for grass seed and labor sowing it, of one dollar and fifty cents. It will be seen that these items, as a necessary outlay, commence with the first year and run through the six.

In these six years, the twenty dollars (expended at the outset for dressing, &c.) at annual interest, will amount to twenty-eight dollars and twenty-eight cents ($28.28). The average yearly amount to be charged to the ton of hay is four dollars, seventy-one cents and three mills ($4.713). The amount of one dollar and fifty cents (expense of grass seed, &c.) in the six years amounts to two dollars, eleven cents and one-half, ($2.115). The average yearly amount, which is also to be charged to the ton of hay, is thirty-three cents and six mills ($.336). The value of an acre of land anywhere within ten or twelve miles of market—an acre which will produce hay as above—may be reckoned at fifty dollars. The legal interest on this amount is three dollars ($3.00). The tax will not vary much from one dollar ($1.00) per annum. The expense of cutting, curing and drawing to barn is two to two and a half dollars ($2.00) per ton. This expense will vary somewhat in different localities.

A farm which cuts twenty-five tons of hay will need a barn worth from three to five hundred dollars. This may also serve for a cattle barn, which will reduce the expense of storing hay. Calling the barn worth four hundred dollars ($400), the interest will be twenty-four dollars ($24). The insurance and annual repairs will be four dollars more, making twenty-eight dollars ($28). Dividing this equally between the hay and stock, we have fourteen dollars charged to twenty-five tons of hay for storage, which is fifty-six cents per ton ($0.56).

If the hay is to be sold, and is from two to ten or twelve miles from market, it will cost from one and a half to two and a half dollars per ton to haul it to market and dispose of it.

RECAPITULATION.

Average yearly cost for dressing, etc.....	$4.713
" " grass seed, etc.....	.336
Interest on the value of the land.....	3.00
Tax " " "	1.00
Cost of cutting, curing and hauling to barn.....	2.00
" storing per ton.....	.56
Which gives the total cost of a ton of hay in barn..	$11.609

If the hay is to be marketed, you can add two dollars more per ton for delivery.

This I consider a fair showing. We have made no extra charge for plowing and harrowing. When land is seeded down to grass, it is generally done in connection with some other crop, to which we should naturally charge the plowing and harrowing; at any rate this has been my practice. We have charged nothing for the wear and repairs of machinery and tools; these expenses are included in the cost of cutting, curing, hauling, etc.

From a superficial glance, $11.61 has an ugly look; but when examined, it is not so bad and discouraging as it appears. Let us, for a few minutes, examine this matter carefully, and see if we can't change this ugly look. There are, at least, four noticeable features, and all favorable to the producer: First, if the hay is sold at the average market price for good hay, there is a profit; small, to be sure, but still a profit. Second, very little money has actually been necessary to be paid out. A business that can be carried on without money, and at a profit, is most certainly a good business. Third, labor has received a fair remuneration. When one can labor on his own farm at good wages, he ought to be more than satisfied; he ought to be thankful. Fourth, the interest, though a proper charge in the account, is not an expense paid out, assuming that the farm is not under a mortgage. Deducting this, brings the actual cost down to eight dollars and sixty-one cents, ($8.61) and this almost wholly furnished by labor and material.

Continuing the discussion, we will, as before, assume that the acre will produce six tons of hay in six years. According to the chemical analysis of a ton of hay, it contains about six dollars' worth of nitrogen, phosphoric acid and potash. Six tons of hay, therefore, will remove from the soil thirty-six dollars' worth of these ingredients in six years, no matter whether it is supplied by home-made or commercial manures. The value of these ingredients is based, I believe, on the market price, which, like other commodities, varies according to demand or stock on hand, and not on their intrinsic worth, which, so far as I know, has not yet been practically and satisfactorily settled. But we take the figures. Instead of applying the manure at the outset and charging interest, we will expend it evenly year by year, just enough to grow a ton of hay, and make no charge for interest. As the same result will repeat itself every year, it is sufficient to give it for one.

A ton of hay, then, will remove from the soil fertilizers valued at	$6.00
Cost of grass seed (an annual expense)	.336
Interest on the value of the land	3.00
Tax " " "	1.00
Cost of cutting, curing and hauling to barn	2.00
Cost of storing in barn	.56
Which gives a total cost of	$12.896

Now this amount is discouraging, and will not be acceptable to our farmers, and I can only modify it by eliminating the interest, and paying a less price for labor, which covers nearly all the remaining expense. In this connection, however, I might add a remark on one or more points, which may have a tendency to remove the wiry edge.

It may be that we can manufacture nitrogen, phosphoric acid and potash, by feeding stock, cheaper than it can be purchased in the market. Indeed, I think it must be so; or else our crops are costing us enormously dear. This is a branch of the subject to which I have never given much thought, and to demonstrate it involves a great many difficulties; but if, by feeding concentrated food in connection with ordinary rations, we can increase the value of the fertilizers above the cost—as we are told that numerous experiments have proved that the increase in growth in beef and dairy productions will pay for the extra feed (that is, the concentrated), and leave ninety per cent of the fertilizing material voided—then, if this be true, we have a key to the hardest part of the problem.

Another point is the mechanical operation of the manure, which promotes plant growth, and adds largely to the value of the crop without directly enriching the soil. It is an agent, however, by which the soil becomes enriched through its action of disintegration, opening it, and giving a freer circulation to water and air, which deposit more or less fertilizing matter.

We will continue the discussion from another basis. In the preceding calculations the value we have put upon the land may be objected to as being too high, so we will reduce it to twenty-five dollars an acre. We will put the fertilizing elements which a ton of hay consumes from the soil at five dollars, which is less than I have ever seen it calculated. And, further, we will reduce the time for growing six tons to five years. This amount of hay will draw

on the soil to the amount of thirty dollars' worth of fertilizing material, which must be pre-supplied in manure; to which add five dollars for necessary labor in hauling and spreading it, and we have expended thirty-five dollars ($35.00) at the outset. In five years this will amount to forty-six dollars and eighty-three cents ($46.83), a yearly average of nine dollars and thirty-six cents ($9.36), rejecting mills. The necessary pre-outlay for grass seed is one dollar and a half, which, in the given time, will amount to two dollars, an average of forty cents. Assuming the yield to run evenly through the five years, the cost will be as follows:

Yearly average for dressing, &c.	$9.36
" " grass seed, &c.	.40
Interest on the value of the land	1.50
Tax " " "	.50
Cost of cutting, making and hauling to barn	2.40
Cost of storing in barn	.67
Amounting to, as the cost of one and one-fifth tons,	$14.83

which is twelve dollars and thirty-six cents per ton ($12.36).

Now let us change our stand-point, and let the yearly production more nearly correspond with what actually grows. It may fairly be distributed as follows:

The first year the acre will yield	3,000 lbs.
" second " " " "	3,000 "
" third " " " "	2,500 "
" fourth " " " "	2,000 "
" fifth " " " "	1,500 "
	12,000 lbs.

in all twelve thousand pounds, or six tons. The deterioration in the manure will correspond with that of the hay. The proportionate value of the manure requisite to produce a ton and a half of hay, the amount for each of the first two years, will be three-twelfths of forty-six dollars and eighty-three cents ($46.83).

Amount of manure 1st year is	3-12	of $46.83, which is		$11.71
" " 2nd "	3-12	" "		11.71
" " 3rd "	5-24	" "		9.76
" " 4th "	1-6	" "		7.80
" " 5th "	3-24	" "		5.85
In all amounting to				$46.83

Having made this explanation, we are now able to proceed, and demonstrate exactly what the hay on the acre will cost each year, and also the cost per ton each year, which will vary between the extremes one dollar and fifty-nine cents, and finally the average cost.

Cost for dressing, including labor, 1st year	$11.71
" grass seed	.40
Interest on the value of the land	1.50
Tax " " "	.50
Cost of cutting, making and hauling to barn	3.00
" storing in barn	.84
Amounting in all to	$17.95

as the total cost of producing one ton and a half of hay the first year, which is eleven dollars and ninety-seven cents ($11.97) a ton. It will be the same the second year; but in the remaining years there will be a change in the cost of manure, and also the cost of production.

Cost for dressing, including labor, 3d year	$9.76
" grass seed, as above	.40
Interest on the value of the land	1.50
Tax " " "	.50
Cost for cutting, curing and hauling to barn	2.50
" storing	.70
Amounting for a ton and a quarter to	$15.36

which is twelve dollars and twenty-nine cents ($12.29) per ton.

Expense for dressing consumed the 4th year	$7.80
" grass seed as before	.40
Interest on land	1.50
Tax " "	.50
Expense for cutting, &c	2.00
" storage	.56
	$12.76

the cost of producing a ton of hay the fourth year.

Cost for dressing required the 5th year	$5.85
" grass seed	.40
Interest on land	1.50
Tax "	.50

Expense for cutting, &c.	$1.50
" storing.	.42
Footing up.	$10.17

as the total expense of producing three-fourths of a ton, which is thirteen dollars and fifty-six cents ($13.56) per ton.

Adding the cost of the several years together—this includes manure, grass seed, interest, tax, cutting and storing—we have a total of $74.19 as the cost of raising six tons of hay in five years, which gives us, on an average, $12.36 per ton, which accords exactly with my former calculation. Deducting the interest of $25, which is not really an expense unless the land is hired, and we have $11.86 actual cost.

It will be perceived that the hay deteriorates in production every year after the first two years; and that the increase of cost is greater than the deterioration. The reason of this lies in the fact that the interest and tax run along evenly from year to year, it being the same whether the acre produces two tons or three-fourths of one ton. It really costs more per ton to cut and make hay where there is only three-fourths of a ton to the acre, than it does where there is double this; but in the foregoing calculations, no more has been charged. Had this been taken in consideration, the difference would be greater still.

The important conclusion to be drawn from this is: The higher the tilth of our land, the less the crop will cost per ton, or bushel, and consequently the greater profit.

In the foregoing discussion, I do not claim to be correct. I am aware that the exact cost of raising a ton of hay is a difficult point to establish, and I have attempted only to approximate it. From my own experience, observation and calculation, I conclude the point varies between eleven and thirteen dollars. If I were to fix it from my personal experience, I think it would not vary much from my first calculation, $11.61 per ton.

A word on another point. It seems to me if our people fully understood what a ton of hay cost them, they would not haul it ten miles to market and sell it for ten dollars, which is frequently done. I do not know how far it was drawn, but I have known good hay sold in Bangor market for six dollars a ton. The farmers of Maine are an intelligent people, but they are not always wise. Are we generally aware that by selling hay to go out of the State, we are

impoverishing our farms at the rate of two and a half millions of dollars every year? It is true, we are replacing a part of it by commercial manures, but they do not fill the place of barnyard manure, and never can. But half the number who sell hay do not buy a dollar's worth of phosphates. Is it any wonder that the cry is, "Our farms are running down"? How long is this ruinous policy to continue? At one of the late meetings of the Penobscot County Farmers' Club, I was glad to hear two or three men, who had been in the habit of selling hay, say they had determined never to sell another ton.

The practice of selling hay was commenced because men *thought* there was more money in it than anything else; it was continued from force of habit, and against reason, till the money ran down to a low ebb.

Human life is too short, and the profits of farming too small to make a fortune in the business; and the slow process of accumulating wealth, as compared with some other kinds of business, tends to discontent among this class of men. They seem to think that the primary and only object of living is to make money. So, having failed to accumulate it as rapidly as they wish, they want to sell out and move somewhere else, or go into some other business, in which they *think* money can be made faster. The condition of things is wrong, and results injuriously nine times out of ten.

If you have a good farm, there is certainly no risk in keeping it. It is a safe, solid, and endurable investment, but when it is sold and the proceeds invested in another business, a great risk is taken, and generally the result is disastrous. I cannot now call to mind a single instance of a man who went into farming, carried it on intelligently, and stuck to it as a business, who has not more than held his own, and supplied his household the while with all the necessary comforts of life. But there are plenty who have tried it a little while, got disgusted with it because it didn't pay, sold out, and never have been able to find anything that did pay. So I say, hold on to your farms, raise hay, and keep stock to eat it. Do not spend time envying others who appear to be making money, and about whose inner life you know but little; but rather spend it in devotion to the duties of your business, and in the enjoyment of the blessings with which God has surrounded you.

Stick to the farm because it is yours; it is your home. It may not be so valuable as some others; it may not be so valuable as

you desire, but still, with all its faults, it has many attractions for you which no other farm has, nor can have. Perhaps you were born on it, and have lived on it till now; if so, there are spots and objects all over it which have become so intertwined with your affections that neither time, nor distance, nor place, can ever obliterate the happy memories associated with them. In dollars and cents they may be almost worthless, but in other respects, so far as they affect your inner life, they are invaluable. Gold and silver, and bank accounts, cannot balance them.

If "home is ever so homely" there is no other place in the wide world like it. The farm is your home, the home of your wife and children. It may have faults—almost all farms have—but can you not spend some of your time pleasantly, and even happily and profitably, in correcting these faults? As time and opportunity come around, improve them in smoothing down the rough features, and increasing the attractions, till you become so thoroughly attached to your farm that twice its value in gold will not buy it. Remember, when the farm is sold, the home is sold. How many pleasant memories cluster around the word home! It is worth more than the farm.

Again, the farm is a permanent thing. The fire cannot destroy it, robbers cannot steal it, the wind cannot blow it away, nor can the water destroy it. There is no other security like it. The largest and wealthiest corporations fail; the solidest moneyed institutions are not safe, and are liable to topple over in a financial panic; business men go under by the thousands; but the farm—yes, let me emphasize the word, the *farm* is not in the least affected by any of these calamities. It remains the same solid, substantial source of income, from which the farmer and his household have received their living through them all, and so it will remain. No business disasters, no financial crises can ever affect, injuriously, the safety of this bank. There is but one possible way by which it can be crippled, and this is entirely under the control of the owner, who ought never to overbalance his deposits by making heavy drafts. I have known this to be done year after year without making any adequate deposits; and, of course, the bank has to suspend payment in part. Now, this is a wrong, ruinous policy, and no level-headed man will be guilty of following it.

Farming ought to be considered as a business, entered into and carried on just as any other business should be to make it success-

ful. A man goes into trade: his object is success; he goes into farming with the same object in view. To accomplish this object requires intelligence, close attention and perseverance. These requisites are just as essential to the farmer as the trader; and neither will reach a very high distinction without them.

The farmer now no longer sings by rote; he is learning and mastering all the variations of the scale himself, and the time is coming when the man who "speeds the plow" will no longer remain at the foot. Stick to the farm, but do not grovel there.

W. H. DEERING. Can you give us any idea as to how the soil of your county compares with that in York county.

MR. MURCH. I have made my figures from my own experience on my own soil, and from observation of the soil in my vicinity. Of course I know comparatively nothing of the soil in your county. The soil in my county is variable. My soil is clayey; some quite stiff clay.

W. H. DEERING. Do you think there is any difference between the clayey soils, for grass, and the hard, rocky soils.

MR. MURCH. I have had some experience in both. I consider a clayey soil better adapted to raising hay than a rocky soil.

SEC. GILBERT. I will take the opportunity to call attention to one or two points relating to this problem. The speaker well says that it is a complicated problem, and this presentation of his is only one view of it; and it is the view of hay grown as one naked product, that is, hay grown for sale. You see in his calculations he has taken no other farming operation into consideration. We propose this afternoon to present the problem from other standpoints, but this forenoon the naked problem of hay grown for sale is presented without connection with any other crops. It may be that some of the estimates here may meet some criticism. We all know that on a natural grass soil, like the clays, the crops are more bountiful than will rule on highland, rocky soils. For that reason the cost of a ton of hay on such a soil would be something less, in the same system, than on highland, rocky soils.

Where the hay is all sold from the farm, the fertilizers which produced it must be replaced in full or the land will be reduced, and they must be secured from sources outside of the farm, for, with the hay sold, the farm supplies none. Hence, market values for manures must be used in the estimates.

AFTERNOON.

COST OF A TON OF HAY.

By A. L. Moore, Limerick.

To obtain the actual cost of a ton of hay is not a question of easy solution. It is evident that a formula capable of universal application cannot be made. The subject presents itself in a different light to whoever attempts to investigate. The reason of this is obvious when we consider the natural capabilities of the soil—drainage, freedom from stones, tools used in laying down, rotation of crops or permanent meadows, seasons, and improved machinery in harvesting; all of which conditions vary widely among the different farmers, and serve to increase or decrease the cost of hay.

In pursuing the subject it is unwise to deceive ourselves. We should look at it solely from a business point of view. An accurate determination of the result would seem to depend upon a series of experiments conducted for a term of years with great exactness and skill.

In this connection, it is well to state, our individual experience is given, and that should be considered as only approximately correct even for our own farm. It would, perhaps, be uninteresting for me to give a minute and particular description of the soil and the practices upon the farm under consideration, other than what would help to give a comprehensive view of the subject. The larger portion of our mowing land is in permanent meadows, reclaimed at large cost from a worthless swamp. The plan usually followed is to seed once in eight to ten years. My comptutations are based upon average results, as I consider these more reliable than if based on particular ones. I have in mind one piece of land on our farm which is good for three tons of hay per year at first cutting, for a series of years. Other instances might be mentioned of three tons per acre at first and one ton at second cutting. It is sufficient for our purpose, however, to give the average returns of an acre for a term of eight years, as follows:

1st year	3 tons	5th year	1½ tons
2d "	2½ "	6th "	1 "
3rd "	2 "	7th "	1 "
4th "	2 "	8th "	1 "
Total			14 "

We thus have a total of fourteen tons for the eight years. Now, then, in order to arrive at the actual average cost of a ton of this hay, we have this rule: Find the net cost of each year's product, and divide the total cost of the term of years taken by fourteen, the total product.

I start with land worth fifty dollars per acre, and reckon interest at five per cent, which is certainly a liberal allowance, considering the safety of the investment. The following items of expense in manuring and laying down are now charged:

Plowing	$ 5.00
Manure and applying, ten cords	50.00
Harrowing	2.50
Seed and application	2.00
Picking stones	2.00
Total cost of laying down	$ 61.50

It costs us an average of $2.50 per ton to harvest the hay; tax on land, $1.00 per year.

We now have the following: 1st year's expense, including interest on land and cost of laying down, taxes, and harvesting

2d year's expense	$14.07	
3d "	12.82	
4th "	11.57	
5th "	11.57	
6th "	10.32	
7th "	9.07	
8th "	9.07	
	9.07	$87.56
Add cost of laying down		61.50
Total cost of hay for eight years		$149.06

Dividing by the number of tons (14) of hay produced, we have $10.64 as the average cost of a ton of hay on this farm.

Hay has averaged $15.00 per ton in our local market for the past ten or more years. Should it be raised for market, storage of

course would have to be supplied, the cost of which would be not less than $1.00 per ton.

This determination appears to me to be correct.

COST OF HAY IN ROTATION.

By S. L. Holbrook, Brunswick.

I do not always like to talk on so dry a subject as hay, and, come to mix it with figures, it will be exceedingly dry, I fear, unless moistened a little by discussion.

I live in a community where grass is made quite a specialty, and I think I am safe in saying that in no part of the State will you see more luxuriant fields of grass than may be seen for a number of miles along the highways in that vicinity. This is certainly an important question to discuss, for hay is our salvation in the State of Maine. Certainly there is no better evidence of prosperity than fields of waving grass and barns overflowing with hay. When I was somewhat younger than I am now, I had the good fortune to be poor, and I bought a piece of land of a wealthy man. After I had bought it and given my notes, the question came up whether I could pay for it, and I expressed some doubt to him; said he: "It is owing to how you manage." I have remembered that remark all these years, and I have found that it is true in farming as in other branches of business—success depends on how you manage. But without any more preliminary remarks, I will proceed to read some of the figures which I have made, and which are based on my own experience. The soil in my vicinity and on my own farm is of clayey formation, which is especially valuable for its retention of the fertilizers that are applied.

Five Years' Course.

I will give first my experience for a five years' course. I have kept a particular account of an acre of land for the last five years.

One acre, five years' course, one year in grain, four years in grass; land in poor condition.

Dr.

Ploughing land	$3.00
Harrowing	2.00
6 cords of manure	30.00

100 bushels ashes	$20.00
Seed grain	4.00
Grass seed	5.00
Sowing grain and harrowing	1.50
Harvesting and threshing	6.00
Interest on land for five years	15.00
	$86.50

Cr.

By 39 bush. of wheat at $1.50 per bush	$58.50
1½ tons of straw	9.00
In debt	$19.00

The next four years gave me two tons a year, or, in the four years, 8 tons, worth $64.00. A profit in the five years of $45.00. Or in other words, for 8 tons of hay I paid $19.00, which is $2.37 per ton, standing in the field. In the barn it will cost me $4.37.

You see I do not agree with Mr. Murch in the item of seed. I cannot seed my land down to suit me with $1.50 worth of seed to the acre. I believe in a liberal amount of seed, and so, as you see, have charged five dollars for the same seed. I have taken the value of the hay standing in the field as the basis of my calculation, and placed it at eight dollars a ton. It will net anybody that amount if it cuts two tons to the acre.

Four Years' Course.

I will now give you the figures of a rotation in a four years' course, of which the first year is grain.

Rotation.

First Year, Grain.

Dr.

Plowing land	$3.00
Manuring, 4 cords of manure	20.00
200 lbs. of fertilizer	4.00
Seed grain, 3 bushels	2.70
Harrowing and sowing	2.00
Harvesting and threshing	5.00
Interest on land for 4 years at 6 per cent	12.00
	$48.70

CR.

By 30 bushels of mixed grain	$24.00
1 ton of straw	6.00
	$30.00

In debt for first year, $18.70.

The manure I have placed at five dollars a cord, delivered and applied to the land, and I think that is just about what it costs me when I pay from three to four dollars a cord for it and move it at my own expense. I haven't made any account of taxes, but I have charged high enough interest to allow a little for taxes, if you please. I pay about ten mills on a dollar for taxes, and I value my land in this calculation at $50 an acre; so the taxes would be but 50 cents. After harvesting and threshing my grain at the end of first year I am in debt $18.70. The second year I plant potatoes, and here are the figures:

DR.

Plowing land	$ 3.00
Harrowing same	2.00
4 cords of manure	20.00
200 lbs. of fertilizer	4.00
10 bushels of seed potatoes	6.00
Planting	4.00
Hoeing	3.00
Harvesting	8.00
	$50.00

CR.

By 175 bushels, at 60 cents	$105.00

Profits on crop, $55.00.

Third Year, Planted with Corn.

DR.

Plowing land	$ 3.00
Harrowing	2.00
4 cords of manure	20.00
200 pounds of fertilizer	4.00
Seed corn	.50

Planting	$3.00
Hoeing	3.00
Harvesting and husking	10.00
	$45.50

Cr.

By 50 bushels corn	$35.00
2 tons stover	12.00
	$47.00

Profit on corn crop, $1.50.

Fourth Year, Mixed Grain.

Dr.

Plowing	$ 3.00
Harrowing	2.00
4 cords of manure	20.00
200 lbs. fertilizer	4.00
Seed grain, 3 bushels	2.40
Sowing and harrowing	1.50
Grass seed	5.00
	$37.90

Cr.

By 30 bushels mixed grain, at 80 cents per bushel	$24.00
1 ton of straw	6.00
	$30.00

In debt, $7.90.

You will at once see that in this four years' course, there has been an actual profit of $29.90, and the land left in splendid condition for a grass crop for two or three years, which ought to give five tons in three years, when the land will be in good condition to plough again for another course.

At the end of the four years the profits on the crops have amounted to $29.90. What is the grass crop going to cost in this case? It will cost nothing, standing in the field. It is all actual profit. The land has been put into condition, and the crops have paid for the manure and for all the work done to it, and a profit of $29.90 besides. All there is to be done for three years is to cut the grass. I do not see where it is going to cost anything except the harvesting.

Five Years' Course, Fertilized With Ashes.

One acre with ashes, land in poor condition, one year in grain, four years in grass.

Dr.

Plowing land	$ 3.00
Harrowing	2.00
150 bushels of ashes (leached)	30.00
Seed grain, 3 bushels	2.40
Grass seed	5.00
Sowing and harrowing	2.00
Harvesting, threshing	6.00
Interest on land for five years	15.00
	$64.40

Cr.

By 30 bushels of mixed grain, at 80 cents per bushel,	$24.00
1 ton of straw	6.00
	$30.00

Land debtor, $34.40.

The four years that the land will be in grass will give 6 tons of hay, which has cost the amount the land is in debt, $34.40 or $5.73 per ton, and leaving the land in much better condition than before.

Five Years' Rotation.

First year, corn; 2d year, potatoes; 3rd year, mixed grain; 4th and 5th years, grass. On this acre we will use manure made on the farm, which, under a good system of management, will not cost anything but the hauling and applying to the land.

Dr.

Ploughing land	$ 3.00
Harrowing	2.00
Hauling manure	10.00
Seed corn	.50
Planting	4.00

Hoeing	$ 4.00
Harvesting	10.00
Interest on land for five years	15.00
	$48.50

Cr.

By 50 bushels corn	$35.00
3 tons stover	15.00
	$50.00

Profit, $1.50.

Second Year, Potatoes.

Ploughing	$ 3.00
Harrowing	2.00
Hauling manure	10.00
Seed potatoes	6.00
Planting	4.00
Hoeing	3.00
Harvesting	10.00
	$38.00

Cr.

By 150 bushels potatoes	$90.00

Profit on potatoe crop, $52.00.

Third Year, Mixed Grain.

Dr.

Ploughing land	$ 3.00
Harrowing	2.00
Hauling manure	8.00
Seed grain	2.40
Grass seed	5.00
Sowing and harrowing	1.50
Harvesting and threshing	6.00
	$27.90

Cr.

By 30 bushels grain	$21.00
1 ton straw	6.00
	$27.00

In debt, third year, 90 cents.

2d year, a profit of	$52.00
1st " "	1.50
	$53.50
3d year, in debt	.90
Total profit for three years	$52.60

Fourth and fifth years, grass, which will give four tons, worth $32 net, or a profit on the five years' course of $84.60.

That, gentlemen, is the way I figure the cost of raising hay. If you should make it a specialty, it will cost you from eight to twelve dollars a ton. If you grow it in connection with other crops, in rotation, and with barn manure, it simply costs you nothing but the cutting and storing in the barn. That is my experience.

Question. I would like to ask the gentleman what kind of grass seed he uses.

MR. HOLBROOK. I use all kinds, as many kinds as I can get. I like to use a large variety and a plenty of it. I put on perhaps more than is actually necessary, but I prefer to put on more than enough rather than not enough. It is safe to sow a good lot.

Question. Do you sow considerable clover?

MR. HOLBROOK. Yes, I like to sow about twenty pounds of clover.

Question. Do you ever seed down to grass in the fall?

MR. HOLBROOK. I seed as early in August as I can, so the roots will get strong enough to stand the cold weather. And that is another reason why I like to sow a good amount, so to get a good mat to resist the frost.

Question. Don't you think it would be better not to sow this crop of grain that you spoke of, but to seed down in the fall to grass?

MR. HOLBROOK. I think not. We get about twenty-five dollars from the grain crop, and that is worth more than the grass crop.

Question. Do you sow wheat in your mixed grain?

MR. HOLBROOK. Yes, I put in about one third wheat, and it makes a valuable feeding grain.

Question. Do you plow your manure in, or harrow it?

MR. HOLBROOK. I merely mix it with the surface soil; just harrow it in with a disc harrow.

Question. At the present day can you afford to do without commercial fertilizers?

MR. HOLBROOK. I use them and think it profitable. It is about the same as feeding grain with your hay; you cannot afford to feed hay unless you feed grain. I don't think any farmer can get ten dollars a ton for his hay by feeding it alone.

COST OF A TON OF HAY WHEN FED ON THE FARM.

BY J. M. DEERING, Member from York County.

I do not propose to take up much time upon this subject, as the gentlemen who have preceded me have dealt with the question in a much abler manner than I can, and as they have gone over the field very thoroughly, and explained the various points very satisfactorily, there seems but little that I can say. But I have a few figures to place before you for your consideration. As we have had the question answered, what it costs to raise a ton of hay for sale, and also by rotation, there seems to be another answer required, and that is, what it costs to raise a ton of hay when fed upon the farm. I do not intend to make any extravagant figures, but I intend to work upon a basis that is within the reach of any reasonably good farmer in the county of York.

I have heard several farmers say that there can be no definite answer given to the problem by any one. I must say that I differ with those gentlemen. I say there is a way to tell, although different conditions and different treatment will change the cost. When all theories and formulas fail, I say we can take an acre or plot of land, and keep an account with it for a series of years, and tell correctly what it costs, if we work upon the right principle. In order to do this, we must work by rule. According to my idea we can not receive any definite result in one year, so we will make the time six years. It would not be fair to apply this rule to the best intervale land situated upon the Saco River, or upon the banks of the Kennebec, nor would it be fair, on the other hand, to apply it to plains land. We will apply it to an acre of good, fair grass land, situated anywhere you please in the county of York, that has been under a process of continual cropping for a number of years. This is the condition of the majority of farms in our county. What we want is to get at, as near as we can, a case that will apply to the most farms in the county. It would not be fair to pick out one

particular farm, or an acre of the best land we can find. This rule will apply to land of any price per acre, but, of course, the cost would be changed. Value of the acre of land described, $50.

Interest on $50 dollars for 6 years	$18.00
Tax one per cent on $30 (a fair valuation)	.30
Plowing one acre of land	5.00
Seven cords of manure at $6 a cord	42.00
Harrowing one acre	3.00
Grass seed and sowing	1.50
Cutting or harvesting hay	18.00
	$87.80
Interest on cutting and tax, $18.30, at 3 per cent for 6 years	3.29
Interest on $51.50, amount actually paid out on the start	18.50
Total expense and interest for six years	$109.59

Now, let us see what we have got from this acre of land. We have charged everything to it that we have put on it, and also reckoned interest on the money invested. Let us see what we have got for credit. I claim that an acre of land handled in this way will produce the first year 2 tons; second, 2; third, 1½; fourth, 1½; fifth, 1; sixth, 1; making in all nine tons, or an average of one and one-half tons per year for six years.

We propose to eat the hay upon the farm. One ton of hay contains five dollars' worth of plant food or fertilizing properties, providing the manure is taken good care of. I do not mean for it to be thrown out of doors, exposed to the wind, weather and sun, but kept in a cellar or shed, with a sufficient amount of absorbent to take up the liquids. Nine tons of hay will make forty-five dollars' worth of manure. If we eat this hay, and realize twelve dollars per ton for it, which according to my experience is very near its average feeding value, we would receive twenty-four dollars for it the first year. To deal fairly, we must reckon the interest on twenty-four dollars for the five following years, which will be $7.20. Interest on $24, second year, for four years, $5.76. Interest on $18 for three years, $3.24. Interest on $18 for two years, $2.16. Interest on $12 for one year, 72 cents, making a credit of interest of $19.08.

DR.

One acre of land stands:

Paid out in the 6 years $109.59

CR.

By manure $45.00

interest on profits of crop 19.08

64.08

Striking the balance, gives actual cost of hay $45.51

Hence one ton costs $5.05.

I do not say that in another accurate experiment these figures will be obtained, because we might not get just nine tons of hay—it might lack a little, it might go over a little—but it would approximate very close to it. Manure is considered by some farmers as a waste product, costing nothing, but in keeping an account with a plot of land it must be reckoned at its value, or the account is not correct.

As we have dealt with this acre of land and fed the hay, let us now deal with it and sell it, and note the difference. The average price for hay sold in the barn in York County for the past six years has been very near thirteen dollars per ton. Selling the hay does not change the amount paid out, hence we have $109.59 debt. Let us see what we have for credit. We must deal as in the other chart. Two tons sold the first year for twenty-six dollars. Interest for five years, at six per cent, will be $7.80; interest on $26 for four years, $6.24; interest on $19.50 for three years, $3.51; interest on $19.50 for two years, $2.34; interest on $13 for one year, 78 cents, making a total credit of $20.67. This is all the credit we can find, because we have sold the hay. The account by selling the hay stands thus:

DR.

Paid out in the six years $109.59

CR.

By interest on money received for hay sold 20.67

The balance gives total cost of hay $88.92

or the cost of a single ton, $9.88.

In proof of the correctness of the estimated cost of cutting and harvesting hay, $2 per ton, I here give the following itemized account of cutting two hundred tons of hay.

1 man 20½ days, at $2.00 per day	$41.00
1 " 17½ " " "	35.00
1 " 13½ " " "	27.00
1 " 13½ " " "	27.00
3 " 61½ " 50 cents per day	30.75
Board of men 20½ weeks, $3 per week	61.50
1 pair horses 20½ days, at $2.00	41.50
1 " " " " $1.00	20.50
2 " oxen " " $2.00	41.00
Self, 20½ days, at $2.00	41.00
1 boy, 20½ days, at 50 cents	10.25
Wear and tear of machinery	25.00
Total cost	$401.50

We have sold our hay that cost us $9.88 per ton, for $13, and have made out of the operation, in six years, $28.08, or $3.12 per ton profit. Let us see what we can make out of the operation by feeding, providing we realize $12 per ton for it. We have nine tons that cost us $5.05 per ton, and if we have got $12 for it, we have got out of the operation $62.55. This gives us a balance in favor of feeding of $34.47.

This may look a little large, but it is none too much. A farmer that cuts 50 tons of hay, and sells it, makes for his year's work $156. By feeding it, he makes $347.50.

To prove the feeding value of hay I give the following experiment of 150 days' feeding eight steers—four two-year-olds and four one-year-olds:

These steers were weighed November 19th, 1883. No. 1 weighed 1,260 lbs.; No. 2, 1,220; No. 3, 875; No. 4, 910; No. 5, 890; No. 6, 765; No. 7, 750; No. 8, 740. The eight weighed 7,465 pounds. The eight gained in 150 days: No. 1 gained 375; No. 2, 240; No. 3, 305; No. 4, 325; No. 5, 325; No. 6, 233; No. 7, 240; No. 8, 228. They all gained 2,271 pounds.

Value of steers Nov. 19th	$335.92
Cost of meal, 150 bushels	112.00
	$447.92
The steers consumed 8¼ tons of hay. April 19th they sold for	595.73
Balance in favor of steers	$147.81

Allowing the manure to offset the cost of care—and it will do more than that—the hay netted $17.91 per ton. The best of care and feed were given to these steers.

On the 16th of last March I purchased a pair of steers, thirty-five months old, girth 7 feet 2 inches, weight 3,220 pounds. An accurate account had been kept of the feed eaten and the cost of the same, from the time they were dropped up to the day of their sale. The feed was reckoned at its market price. The first year the cost was $75; second year, $56; and for the last eleven months, $40. Total cost for the thirty-five months, $171. The reason the cost was not as great the last year as for the year previous was that they were fed ensilage during the past winter, forty pounds a day, with only one foddering a day of hay. The ensilage was reckoned at cost, $2.50 a ton. These steers were raised and fed by a young man less than twenty years of age. Price paid for the steers, March 16, 1885, $200. It cost the boy $171 to raise them. Who shall say that it does not pay to feed well?

SEC. GILBERT. There seems to be an error of reckoning in the cost of keeping the pair of steers you have been speaking of, which accounts, in part, for the apparent saving in cost during the last eleven months. The ensilage is reckoned at cost, while the hay consumed the year before was reckoned at market value. Here has been one great error in our computations of the cost of feeding steers and oxen, and it has been the means of drawing erroneous conclusions. In computing the cost of growing steers, or feeding any animal, all the fodders should be reckoned at cost instead of at market value. This is the only correct method. If in this case the hay had been figured at $5.05 a ton, the actual cost as by one system of raising it, or even less than this by another system, the wide difference of cost in those two years would disappear, and the profits on growing the steers would be greater than as now appears.

COST OF HARVESTING HAY.

By W. W. Harris, Member from Cumberland.

We cannot give too much attention to this question of the cost of any of our farm products. The more study we give to this subject the better for our pockets. I find in my farming that the expense account is the most serious one I have to contend with. I am obliged to conduct all my operations, in doors and out, with hired labor, not always getting the best, and frequently being obliged to pay the highest price for the poorest quality. As I have been introduced as a man who has made three blades of grass grow where but one grew before, perhaps it will be expected that I should give some of my personal experience. Some nine years ago I bought an old farm of about 110 acres. It was all cleared, and is all, as you might say, tillage land. By that I mean that I can cultivate every acre of it. It is clayey loam, and was all in grass except half an acre. I came into possession of the farm on the first of July, and I cut all the grass that was worth cutting and some that was not. I got about thirty tons of a poor quality of hay. At the present time I do not think I am getting a good crop if I do not get one hundred tons from that same farm, with thirty acres under the plow, and a portion devoted to pasturage. But lest this statement may seem too large, I will say that I feed in the barn through the summer to some extent. I trust the Secretary will pardon me if I step a little outside the limits which he prescribed for me, which embraced only the question of the cost of harvesting a ton of hay. I have made a few figures in regard to the cost of producing hay in connection with rotation. I have done it from my stand-point. My land is perhaps under a better state of cultivation than the average of farms in the State. I do not say better than any, because there are many better than mine; but I say that the figures that I have made are based upon my own experience, and they show no better results than may be attained by any farmer in the State who has good land. I do not pretend that my figures are exact; they are largely estimates, but they are based upon my experience. In my dairy management my system of feeding is partially soiling my cows in the summer, and my dairying is butter making. Of course, in my partial soiling system, I want green fodder for summer feed, being short of pasture. I have placed this upon the basis of different

crops, to test the real cost of a ton of hay. One of my favorite crops for a soiling crop is rye, followed by Hungarian; sowing with rye in the fall, three bushels to the acre, getting a very thick stand; feeding what I care to up to the 15th of June, and cutting the rest and curing for hay; thoroughly cultivating the land, putting on additional phosphates, and sowing immediately to Hungarian. That gives me in one summer two splendid crops for soiling or for hay. I regard the Hungarian as the best hay crop I raise.

I place great stress upon pulverization, and so in my calculations I allow more for harrowing than many people do. I find that for every dollar I expend in horse power, in pulverizing my land and fitting for the crop, I get as much work done as from an expenditure of two, or three, or five dollars for hand labor. I believe in a liberal use of horse labor.

I will now give you my figures of the cost of my three crops in rotation, and the value of the product:

Rye.	Plowing	$ 3.00	
	Manure	20.00	
	Harrowing	3.00	
	3 bushels rye	2.55	
	Sowing	.50	
	Harvesting	6.00	
			$35.05
Hungarian.	Harrowing	2.00	
	500 lbs. phosphates	10.00	
	1 bushel seed	1.50	
	Sowing	.50	
	Harvesting	6.00	
			20.00
Oats and Barley.	Plowing	2.00	
	500 lbs. phosphate	10.00	
	Harrowing	2.00	
	2 bushels seed	1.20	
	Grass seed	1.50	
	Sowing	.50	
	Harvesting	6.00	
	Threshing	7.80	
			31.00
			$86.05

Product.

3 tons rye hay, at $10	$30.00
3 tons Hungarian, at $10	30.00
65 bushels grain, at .60	39.00
3 tons straw, at $5	15.00
	$114.00
Cost of cultivation, manure, seed, &c.	86.05
Profit	$27.95

When I come to sow my Hungarian, the sod having been turned under the fall previous, this phosphate is sowed upon the surface and thoroughly incorporated with the surface soil by a Randall harrow; the Hungarian is sowed, a bushel of seed to the acre, and brushed over with a brush harrow or a Thomas smoothing harrow; and I am morally certain to get three tons of splendid hay from that bushel of seed. After this is off, I turn the stubble under and let it remain there until the following spring, and then pulverize the soil with a harrow and apply 500 pounds more of phosphate, and sow it to oats and barley mixed, one bushel of each to the acre. I do not allow as much for grass seed as Mr. Holbrook; I allow $1.50, the same as the other gentlemen have. In that way I secure three crops in two seasons. I do not put all this into the barn in the form of hay, for I feed all I need of it, in the green state.

Now I will give some figures for potatoes, followed by oats and barley.

Potatoes.	Plowing	$ 3.00	
	Manure	20.00	
	Phosphate	10.00	
	Harrowing	3.00	
	Seed	5.00	
	Planting	5.00	
	Harrowing with smoothing harrow,	.50	
	Cultivating and hoeing	5.00	
	Two doses Paris Green	1.00	
	Harvesting	6.00	
			$58.50

Oats and Barley.	Plowing	$ 2.00	
	Phosphate	10.00	
	Harrowing	2.00	
	2 bushels seed	1.20	
	Grass seed	1.50	
	Sowing	.50	
	Harvesting	6.00	
	Threshing	7.80	
			$ 31.00
			$89.50
	Product.		
	200 bushels potatoes, at 50 cents		$100.00
	Grain and straw		54.50
			$154.00
	Cost		89.50
	Profit		$64.50

The fifty cents for harrowing the potatoes, I have allowed for going over them with a Thomas smoothing harrow just as they are breaking ground, which I consider a very advisable course.

Then I have another course here, of sweet corn, potatoes, and oats and barley. Here is a three years' course before you put in the grass; the two courses that I have given have been for two years only.

Sweet Corn.	Plowing	$ 3.00	
	Manure	20.00	
	Phosphate	10.00	
	Harrowing	3.00	
	Seed	1.00	
	Planting	1.00	
	Twice harrowing	1.00	
	Cultivating and hoeing	5.00	
	Picking corn and hauling to factory	5.00	
	Harvesting stover	5.00	
			$54.00
Potatoes.	Cost of		58.50
Oats and Barley.	Same as before		31.00
	Cost		$143.50

Product.

Received from factory for corn	$ 65.00
Stover	15.00
200 bushels potatoes	100.00
Grain and straw, as before	54.00
Value of product	$234.00
Cost	143.50
	$90.50

The item of $65 received from factory for corn is larger than the average amount that would be obtained, I am aware; but I received $125 for the product of two acres, delivered at the factory, and so I have placed that item at that figure. You will see that I, unlike those who have spoken before me, have made no talk about the value of the land, interest, taxes, or anything of that sort. I have simply taken this land and handled it, and given you the results.

In this two years' course of rye, Hungarian and grain, we found a profit of	$27.95
In the second operation of two years, in potatoes, and oats and barley, we found a profit of	64.50
And in the third, the three years' course, of sweet corn, potatoes and oats and barley, the profit was	90.50
Total profits from the three acres	$182.95

Dividing this amount by three, we find an average profit per acre of $60.98. This is ten per cent interest for each acre for six years, upon a valuation of $100 per acre. So we have four years to cut hay on two acres and three years on one acre. The land is well fertilized and pulverized, and will cut two tons per acre for three years on all, and one and a half tons on two acres for one year more, making in all 19½ tons; and the previous crops have paid their own bills, and paid ten per cent interest on a valuation of $100 per acre for the six years; so we have only the cost of harvesting the hay to charge to the account of hay; and when we know the cost of harvesting we know what the hay costs.

I am going to say that two dollars per ton for harvesting is a liberal estimate. I base it upon this. I have put 100 tons in my barn in 18 working days, with four men besides myself, a pair of horses, a pair of oxen to haul in the hay, and the necessary

machines, tools, carts, &c. My four men cost me per month, reckoning three dollars per week for board, $116.00. So I think it safe to say two dollars per ton is a liberal average, with a smooth farm and the necessary implements to do the work.

If I am correct in my figures, we have 19½ tons of hay at a cost of two dollars per ton. I presume it is safe to appraise the hay in the barn at $10 per ton, or $195. Deducting $39 for harvesting leaves a net profit of $156, after having received in previous crops 10 per cent per annum on $100 per acre for the whole time. Remember, this is based on buying all manures, fertilizers, seed, &c., and paying all bills. If we can use this product to make beef, milk, butter or growth of stock, and realize over ten dollars per ton, then we have another profit, and will not need to buy manure, as we have that without cost.

The speakers to-day have talked as though they were a little afraid to place the yield of hay as high as two tons to the acre, and if they have done so they have seemed to feel it necessary to apologize for putting it so large, but I do not think that figure is at all extravagant. I have harvested from four or five acres in one body, at least five tons per acre from two crops in one season, three the first time and two the next. You cannot always do it, but I have done it quite often; but that, you understand, is the first year, and it is rank hay, clover mostly.

The item of 100 tons of hay put into my barn is estimated upon this basis. I sell some hay, though I feed most of it; and when I sell off a band of hay and find out what it weighs, I can tell pretty near how much there is in a mow; and then, again, I can reckon by the loads. I always keep account of my loads, and judging from the hay I sell, I can tell pretty nearly how much there is in a load. My men would say that what I call 100 tons was 110. I am very confident that when I set the amount at 100 tons, I speak within bounds.

There are no cross fences on my farm. I presume one man can do in one day all the hand mowing there is to be done on my farm, and I can rake it all with the horses. It is all in one field, and when I start to mow I go around whatever comes handy, whether it is five acres or twenty-five.

In regard to the cost of labor; it makes a difference whether you hire your men by the day in the haying season simply, or whether you have work upon your farm that requires you to keep a crew at

all seasons of the year, and especially in the summer season, that gives you all the help you need in haying. If I have four or five men that I am paying an average of $17 a month, and they are worth that money to me, aside from haying, they are costing me no more in haying than at other seasons.. But the man who hires men to get in his hay by the day pays haying wages, which are considerably higher than monthly wages.

I think it is a very important matter for us to consider, that there is a wide difference in the cost of producing hay to feed on the farm, and producing it to sell. In the one case we get our fertilizer mostly without cost. I claim that I can feed hay in connection with other feeds, to my cows, and sell my hay in the form of butter, feeding the skim milk to the calves and pigs, and make the hay bring me $15 per ton, instead of selling the hay itself for $12; and I have all this fertilizing material left, which I claim cost me nothing.

W. H. DEERING. Tell us how your farm compares with other farms in your town in regard to the character of the soil.

MR. HARRIS. There are plenty of farms as good as mine.

W. H. DEERING. I disagree with Mr. Harris in regard to the amount that should be charged for the labor of the men. I understood him to say he charged what it cost him to hire men by the year. If he hired a man for ten dollars a month and board, he would figure the cost of getting his hay at that rate.

MR. HARRIS. My statement was that I had four men at an average cost of $17 a month and board, for the summer season of about six months. Their wages varied from $13 to $20 dollars, and I charged them at the average, which was $17, and I charged $3 a week for the board of each man.

It costs me just the same in the haying season that it does during the other months, and I see no reason to charge them at a different rate. I hire my men for the summer season, and I require of them just as much in one month as in another.

SEC. GILBERT. We have only a few minutes more to devote to this question, and I want to call your attention to a few points that have been made, in order that you may have a clearer idea of what we have been aiming at. We have men in the State making hay for sale, and who are strong advocates of that system. I was glad to hear the first speaker to-day state his strong conviction that the true course for our farmers is to feed out their hay. He ought to know

something about it, for he has been a farmer for many years and he has been raising hay to sell. According to his presentation of the subject, the cost of hay grown for sale is $11.61 a ton. The young gentleman who followed him, Mr. Moore, fixed upon $12.64 as the cost of a ton of hay grown for sale. In considering the question of growing hay to sell, you have observed that all the speakers have reckoned the manure that must be applied to the soil to produce the hay at what it would cost in the market. It is necessary to do so, because you have no other source of fertilizers if you sell your hay. Consequently, that seems to be a fair presentation of the matter, and we may reasonably conclude that it costs the farmers of this State about twelve dollars a ton to raise hay for sale, when they keep up the fertility of the soil. There are a good many farmers who raise hay at a less cost than that, but they have been year after year reducing the fertility of their farm. It is when the fertility is kept up that it costs farmers twelve dollars a ton to raise hay to sell.

Another presentation of the cost of a ton of hay is when fed out on the farm. Of course the cost of production, in one sense, is the same in both cases; but when the hay is fed out on the farm, there comes in either an item of credit that you do not get in the other case, or else you do not have to charge the manure. That makes a difference in the figures. When you feed hay on the farm you have the manure product left; that manure, placed to the credit of the operation, reduces the cost of the hay, according to Mr. Deering's figures, to $5.05. That is the difference under the two systems.

We go on still further and take up another system, the cost of hay grown in rotation. Under that system, according to Mr. Holbrook's figures, all that the hay costs is the cutting and the taxes on the land. Mr. Harris arrives at the same result in a different way, or a still better result, for he leaves some money in pocket. Let us look at that a moment, because here is an important matter, and I want to impress it forcibly upon your minds. Many of you in York County are raising sweet corn for sale. In that crop you get your pay for the operation in the money received at the factory, though in your account you have charged all the manure you have applied to the crop. That leaves you a crop of fodder that costs you nothing, and that crop of fodder is as good as a large crop of hay.

This is in a system of rotation preparatory to a crop of grass. You seed your land to grain with all the preceding bills paid and a

little money in your pocket, according to Mr. Harris' figuring. The next year comes around your grass crop. Does it stand you in debt? certainly not; you have more money than when you started into the enterprise, and your field is not debtor to you a single cent. This is true not alone with the sweet corn crop. I prize the yellow corn crop, and grow it to a large extent. With my yellow corn crop my fields do not stand me in debt when I get through. I go on the next year with a grain crop, perhaps putting on a little fertilizer, and at the close of that year's operation my grain crop pays all the bills and pays for the grass seed which has been applied. The next year I have a field of grass. I ask you, as intelligent men, how you can charge that crop of grass with anything further than the cutting, and the interest and taxes upon the land. I do not believe it is possible for a correct system of figuring to set that reasoning aside.

But there is a better view than that. Where your hay and all this fodder is fed out on the farm, you have no right to charge the value of your manure. Mr. Deering charged here first the selling value of the manure. He feeds out his hay, and gets as much return as if he sold it off, and he gets the cost of his grain back again in the same way. Mr. Harris is doing the same with his fodder, and Mr. Moore is doing the same with his fodder. Now what does the manure cost? The manure from all your operations lies in your cellar, and all your bills are paid; and all your feed is paid for.

Now, gentlemen, I lay it down as a fact that cannot be disproved, that the manure costs nothing to an intelligent farmer conducting his operations properly. Consequently, you are better off on your corn crop than the figures show. You have no right to charge for manure that costs you nothing. It is not a correct way to figure. It costs something to apply it, and this would be a proper item in the account.

Question. If I have a cord of manure that I could sell for four dollars, and I apply it to my land, must I not charge the crop with it?

SEC. GILBERT. No, because it does not cost you that. You are charging cost. There is where we are very liable to error, in charging values instead of cost. If the manure doesn't cost you anything in carrying on this system of work, you have no right to charge anything for it.

COLLINS EMMONS. In this rotation system perhaps I am a little befogged. I understand that all the benefit you get from the crops of corn, mixed grain and all that, goes to the credit of cheap hay.

I will tell you how we go at the matter of raising hay. We plow our grass land as soon as practicable, put our fertilizers upon the land, and lay it down to grass. The next year we get, on the average, two tons of clean herds-grass hay to the acre. That is what I call going directly to work for grass. Perhaps there is a better way. But what you take out of your land in grain you haven't got left for grass. If you want grass, go for grass.

SEC. GILBERT. The gentleman's presentation is correct by his method of working, but instead of going to town and buying manure at a cost of six dollars a cord delivered, we can, by feeding the hay out on the farm, secure a supply of manure at no cost save that of application; then certainly that system should commend itself as the more profitable. We have shown this afternoon that it can be fed out, and is being fed out, and returning to its producers as much money as when it is sold. The advantages of a stock husbandry and the feeding of hay upon the farm, which the Board of Agriculture has of late been urging upon the attention of the farmers of our State, is at once apparent. We have shown that it costs $11.61 a ton to produce hay for sale, while on a farm where stock is kept it costs only $5.05 or less to produce it. At the same time, under good management, the hay nets as much fed out, as when sold. These are the points we wanted to make plain here to-day.

MR. DENNETT, being called for, said: I have been very highly entertained and instructed by the papers which have been read here to-day and the discussions which have followed. One of the noticeable features of the discussion has been the substantial agreement as to the results, and that shows that the discussion has been conducted by gentlemen who are practical men. I have considered this question from another stand-point, entirely different, so far as the cost of a ton of hay is concerned. I had figured it out before I came here, and I have been astonished to see how nearly the figures which we have had presented here to-day have corresponded with the estimates which I had made as to the cost of a ton of hay. I agree with Mr. Harris on the cost of harvesting. I have run a farm for fifteen years. I have usually three men all summer, and they with two boys do my haying. I call the men $1.25 each and the two boys $1.25, and the use of the machinery, depreciation and repairs, &c.,

two dollars a day, as they are used only for haying. That amounts to ten dollars a day. I find, as a matter of fact, that they will get in just five tons of hay in a day. That makes the cost of getting in the hay two dollars a ton.

One word in relation to the matter of feeding hay on the farm. I was glad to have the matter of feeding the hay developed. It is true that the more you elaborate your products, the more value you get from them. Sell your hay in the form of butter, beef, mutton. There is business in it. You don't want to sell the raw material if you can help it. When you sell anything, get it into just as valuable a form as you possibly can.

I. N. DEERING. I have been very much interested in the discussions to-day. I am satisfied we can cut hay for two dollars a ton with the tools that we now have to work with, and that we can grow it at the price that has been stated here to-day. The figures which have been given agree with those I have made, very nearly.

KNOX COUNTY.

Institute at North Warren.

The Institute for Knox County was held at North Warren, by invitation of White Oak Grange, March 24th. The interest was good, the attendance large, and the programme was well carried out. No report of this meeting is given.

LINCOLN COUNTY.

Institute at Newcastle.

The Farmers' Institute for Lincoln County was held at Newcastle, March 25th. On account of illness, the member of the Board for the county, J. J. A. Hoffses, was not present. The programme included lectures by Dr. G. M. Twitchell and Francis Barnes. No report is given.

FRANKLIN COUNTY.

Institute at New Sharon.

An Institute was held at New Sharon, March 26th. The subject of the forenoon was,

DOES SHEEP HUSBANDRY RENOVATE?

BY J. W. BUTTERFIELD, ESQ., member for the county.

Mr. Chairman and Gentlemen of the Institute:

The theme for discussion this morning, as announced in the programme, is the following, viz: "Does sheep husbandry in Franklin County deteriorate or renovate the fertility of the farms," or in other words, does sheep husbandry, as practiced in Franklin County, exhaust or add to the fertility of the farms in the Sandy River valley. This subject at once opens up a wide field for discussion, and has a direct bearing upon one of the leading industries of the county, so much so, that if the theory once becomes fixed in the minds of farmers, that sheep husbandry exhausts the fertility of their grass lands, a death blow will have been dealt to the leading agricultural industry of Franklin County, in a financial point of view—an industry which for many decades past has filled the purses and gladdened the hearts of the happy husbandman, throughout the length and breadth of the Sandy River valley. But for the purposes of this discussion, I will deny the theory that the rearing of sheep and keeping the same, as practiced by our farmers at the present day, exhausts the fertility of our grass lands, and calls for the proof that the position I take is incorrect. In attempting to speak, briefly, in behalf of sheep husbandry, as not exhausting the soil, I am aware that some authorities —farmers even—have considered the raising and keeping of sheep as detrimental to the fertility of the soil. It is to be admitted at once that the primitive fertility of the soil, on many, far too many, farms, is greatly exhausted. But for this condition there are many reasons for claiming that the sheep, with its "golden fleece," is entirely innocent. Climatic influences, over which human agencies have no control, are slowly, but surely, exhausting the fertility of our farms, especially upon high ridges where the scorching rays of the sun and

the sweeping winds have a direct and powerful effect in producing the escape of those fertilizing materials which formerly produced the wonderful hay harvests, so well remembered, throughout this whole section. These high, airy ridges are the natural home of the sheep and are almost always used as sheep ranges, and when these lands show signs of age and exhaustion, principally from the causes above stated, sheep husbandry is generally charged to be the chief cause. Any upland farm in Franklin County, *if a sheep never sets foot upon it*, in the absence of any *additional* fertilizing material from other sources than its own, by continuous cropping and *from climatic influences* will gradually become exhausted. The "forests primeval," which for ages had protected the land from drought, have been cut away by the avarice of lumbermen, and, in some cases, by the short-sightedness of farmers. It is now well understood that the rainfall is diminished, and that rivers and springs decrease in volume, in proportion as the country is denuded of its forests. The rich deposits of vegetable mold—the accumulation of ages—which so lavishly repaid the first tillers of the virgin soil, have been exhausted by a century or more of continued cropping without adequate returns of fertility to the soil again. This decrease in the fertility of the soil from natural causes, has, in many instances, perhaps thoughtlessly, been attributed to sheep husbandry. The question is frequently asked, how is the farmer, engaged in rearing and selling sheep, to return to the land all the fertility which is taken from it, when the great city is to be fed from his surplus products? But the remedy is at hand. Science, with power born of knowledge, comes to the rescue, revealing new sources of fertility in the form of manufactured fertilizers, which flood the markets in all our principal cities and towns at the present day.

For the agricultural sins, of which many are guilty, let us not make a "scape goat" of the sheep or any other domestic animal. In behalf of the innocent flocks that cluster upon the hill-tops throughout Franklin County, we plead that they be not condemned as unprofitable servants. If the farmer would reap a generous return from his flocks and not exhaust his lands, he must deal generously with them, as to pasturage in summer and food and shelter in winter, and scrupulously return to the soil all the fertilizing material, both liquid and solid, taken therefrom during his yearly operations. Let the sheep have good and abundant pasturage in summer, instead of being assigned, as is often the case, to some barren hill-top, or it

may be to some far-off, rocky mountain-side, where no amount of fertilizing material would ever indicate that sheep husbandry would renovate the fertility of the soil. It is assumed by many of our best farmers, who have been largely engaged in sheep husbandry, that if flocks are not allowed to feed too closely, or later in the season than other stock, that they do not exhaust, but, on the contrary, are actually renovators of the fertility of their grass lands. The opinions of some of Franklin County's largest and most successful farmers, whose principal business during life has been sheep husbandry, whose farms, *to-day*, are models of neatness, thrift and *fertility*, and are living witnesses in support of the theory that sheep are actual renovators of the soil, and these opinions—I repeat—may be of value, as bearing directly upon the subject in hand. The late Ephraim Hackett of Freeman, whose principal business in life was sheep husbandry, once told the writer that, in his opinion, sheep, when turned into his mowing fields in the fall of the year, if not allowed to feed too closely, were an actual benefit to the fertility of the soil and an advantage to the crop the ensuing year. Israel R. Bray, the wool king of Franklin County, is understood to entertain the same opinion, namely, that sheep husbandry enriches, rather than exhausts, the fertility of our farms. His beautiful, well-kept and exceedingly fertile farm on Freeman Ridge, always swarming with large flocks of sheep, shows for itself whether the owner's opinions on this all-important subject are erroneous or correct. Luther Nile, Esq., of Rangeley, who for the past ten or a dozen years has probably kept more sheep than any other single farmer in Franklin County—some seasons wintering five or six hundred—in an able article in the Farmington Chronicle, in the spring of 1882, gives facts and figures from actual experience in support of the claim, that sheep husbandry, in his section of the county, adds to the fertility of the farms. From these few brief statements and suggestions, it appears that a respectable portion, at least, of the farmers of Franklin County believe in the theory, that sheep husbandry, under judicious management, adds to the productiveness of our farms; and in support of this claim I will read a short article published in the New York Tribune, dated February 28, 1883, and signed by Dr. A. M. Dickie, Bucks County, Pennsylvania:

"During a recent visit to my native county of Washington, Penn., after an absence of more than twenty years, the first thing to strike my attention was the greatly increased fertility of the soil during

the interval, as indicated by the numerous hay-stacks and big corn-fodder seen from the car window. When my native hills were reached, land that was perfectly familiar to me until I was twenty-two years of age was equally perplexing upon close examination. Fields that thirty years ago were too poor to pay for cultivating are now good for fifty bushels of corn and one and a half tons of hay per acre, without the application of any fertilizer, and *the sheep did it!* I have heard, through correspondence and otherwise, of the increasing fertility of the hilly country which constitutes the famous sheep-walks; but, behold, the half was not told, and I would scarce have believed it if it had been, and was unprepared for what I saw.

On one farm in particular, which adjoins my ancestral home and which as a youth I knew well, I could scarcely believe my senses. As I remembered the farm it was so poor that it was all a man, and an industrious one at that, could do to make a living on it. The farm now belongs to a relative, and in company with him I went over it and was confounded at every step with the change wrought in its fertility and productiveness. There was evidently, as the Spanish say, 'gold under the feet of the sheep' that trod that farm for the past twenty-five years. The fertility is increased fully 500 per cent, and land that I can remember as too poor to cut one-fourth of a ton of poor, briery hay per acre is now good for easy six times that amount of good hay without a brier in it—and the sheep have done it all. It is not only isolated or occasional farms that have thus been improved; the increased fertility is marked on all the 2,000 and more square miles of territory given up to this specialty.

The country devoted to this sheep husbandry lies between the Monongahela and Ohio rivers, embracing all of Greene and Washington counties, and part of Alleghany in Pennsylvania, and Brooke, Ohio, and most of Marshall counties in West Virginia. This region, as is well known, is the special American home of the Merino sheep. For more than fifty years it has been the nursery where most of the fine-woolled sheep in this country were propagated, and many of as fine flocks as can be found in the world live on these steep and rugged, but dry hills. In the territory indicated there are nearly or quite 4,000,000 head of these fine-woolled sheep, and many of the other millions of sheep in different sections from Texas to Oregon can trace their origin to this same territory.

Some years since the profusely wrinkled sheep were the rage, but their popularity is now on the wane, and they are now breeding out

the wrinkles, retaining the increased size of the animal and their lengthened staple in the wool. The aggregate number of sheep have greatly increased in that locality within the past twenty years, but the numbers will not probably much increase from this time on. The sheep have enriched the soil until it is as productive as the prairies, but much more difficult to cultivate. The price of land has advanced fully 300 per cent within my recollection, and, although it may seem like 'going back on' my native hills, I consider the present prices considerably inflated, though there are always cash buyers for any land that comes into the market."

THE GRASSES OF MAINE.

By Prof. C. H. Fernald, Maine State College, Orono.

The grass family is, without doubt, of far greater importance to mankind than all the other families of plants combined; for, including as it does all the cereals, as wheat, corn, oats, rye, barley, rice, etc., as well as sugar-cane, sorghum, bamboo, and the greater part of the forage plants which serve as food for grazing animals, we may well place this family far in advance of all others from an economic point of view.

When we remember that all our bread-stuffs come directly from this family, and that our meat comes from animals which feed directly or indirectly on the grasses, we can appreciate the profound utterance of the inspired writer when he says, "All flesh is grass."

If all the members of the grass family were swept from the surface of the earth, never to reappear, we can scarcely foretell what fatal consequences would follow. It is very doubtful if man and his domesticated animals could hold their own in the struggle for existence if compelled to seek their subsistence entirely from other plants.

The grasses are the most universally diffused over the globe of any of the flowering plants, for there is no part of the world free from snow, even for a short period of time, where they do not occur, and in nearly all they form a leading feature of the landscape. It has been estimated that there are not far from six thousand species of grasses, of which nearly ninety are already known to be indigenous or to have been introduced into Maine. Omitting the cereals, there are still over eighty species of the grass family already discovered growing wild or in cultivation in this State. Probably not

more than five or six of these are known by the mass of our farmers. The clovers are not included here, as they do not belong to the grasses, but to the pulse family (*Leguminosæ*).

According to the Census report for 1880, there were 1,107,788 tons of hay cut in the State of Maine in the year 1879. If we assume that the average value of that hay was ten dollars a ton, we have $11,077,880 as the value of the hay crop for that year. It would be difficult to determine what proportion of the above quantity of hay was clover, but omitting all reference to the value of the grass in the pastures, which will, without doubt, far more than offset all the clover in the above-named amount of hay, we still have over eleven million dollars for the value of the true grasses which were grown in the State of Maine and cut for hay in the year 1879, and this sum is greater than the amount of the value of all the wheat, corn, rye, oats, barley, buckwheat, potatoes, peas, beans, orchard products, market-garden products and forest products of the entire State for the same year. It may well be claimed that grass is the most important of all our crops, and really forms the foundation of agriculture in the State.

We are informed that Rye-grass (*Lolium perenne*, L.) was first cultivated in England in 1677, but none of the other true grasses for nearly a century later, though the clovers had been cultivated long previous to that time. In 1759, some of the more progressive farmers commenced sowing the seeds shaken out of the best meadow grasses, along with the clovers, and in 1761–64 Timothy (*Phleum pratense*, L.) and Orchard grass (*Dactylis glomerata*, L.) were introduced from this country, and at the present time quite a long list of grasses is cultivated in Europe, and by a few in this country. By far the greater number of our farmers, at the present time, confine their culture to Timothy, Red-Top, Red and Alsike clover, while a few sow Orchard grass, Hungarian grass, and possibly a few others.

A great mistake is often made in sowing too few kinds of grasses, and as a result the plants are so far from each other that ample room is left for undesirable grasses and weeds to creep in. Another mistake is to sow a mixture of seeds of grasses which do not come into blossom at the same time, and it is, therefore, impossible to cut them at a time when all are in the best condition for hay. Many farmers cover their grass seed too deeply. Very careful experiments have been made, which showed that when the seeds of Timothy, Orchard

grass and clover were covered to the depth of from two inches to two and one-half inches, none of the plants came up, and when covered to the depth of one inch, only about half came up, but the greatest number came up when the seeds were covered one-fourth of an inch or less; yet how many farmers sow their seed along with the grain and go over it two or three times with a common tooth harrow! No wonder they are not able to secure a good catch. It is not an easy matter at the present time to secure pure seed, that which is free from the seeds of white-weed, buttercups, cone flowers, and a host of others too common in all our fields. We are not always sure that the seed offered for sale may not have been kept so long as to have lost its vitality. The seeds of most of the grasses are of little value if more than two years old.

It is more than probable that many of our Maine grasses not now in cultivation would prove to be as valuable, or more so, than some now made use of, and that from these wild grasses species might be selected, which would be adapted to the various conditions existing in our fields and pastures, and which would yield far better results than are now obtained. When a farmer observes an unknown grass growing luxuriantly in any part of his field, he should endeavor to find out what that grass is, what is known about it, whether it is of value as a forage, and if it proves to be valuable he should save the seed—unless he can find it for sale—and cultivate it in that part of his field and others of a similar condition. It may sometimes be necessary to make a critical study of a grass to find out what it is and what may be known about it, and to aid in this work was the design of the writer in preparing this paper. A common lens, costing from seventy-five cents to a dollar, will prove of great assistance in the determination of the species.

Structure of the Grasses.

A grass is composed of *root*, *stem*, *leaves* and *flowers*. The roots usually consist of small fibers, which in some species are exceedingly flexible, often extending to great distances in search of food, and branching into innumerable rootlets, the ends of which are the newest parts and composed of those cells which absorb the food for the plant. Besides the roots, many grasses, as witch grass, have *underground stems* (Rhizoma or root-stock), by means of which they rapidly and extensively propagate themselves. These under-

ground stems, unlike the true roots, have joints with scales representing the leaves, and from these joints rootlets are put out and new plants developed.

The stems of the grasses consist of *nodes* and *internodes*, or joints and the spaces between them. The joints are solid, and a cross section is circular in all our species with the exception of wire grass (*Poa compressa*, L., plate XVII). In this species the node or joint is compressed or flattened so that it cannot be rolled between the thumb and finger. The internodes, or spaces between the joints, are hollow in all the Maine grasses except corn and a grass found growing occasionally on our sea beaches and known as Beach grass (*Ammophila arundinacea*, Host.).

The arrangement of the leaves on the stem is of great importance in distinguishing the grasses from some of the related families of plants. In the grasses there is one leaf from each node or joint, the first from the lowest joint of the stem; the second from the next joint above, but on the opposite side of the stem; the third leaf from the third joint and on the opposite side from the last leaf, but directly over the first, and so on. The leaf consists of the sheath (*petiole*), the *ligule* and the blade (*lamina*). The sheath is the part surrounding the stem, and which, starting up from a node, extends nearly up to the next node, where it joins the long, narrow blade of the leaf. Although the sheath surrounds the stem, the edges merely touch or overlap, but are never grown together except in exceedingly rare cases. At the place where the sheath ends and the blade begins, there is a thin and more or less transparent membrane called the *ligule*. This is an upward continuation of the sheath above its junction with the blade of the leaf, and, as it varies in size and form, it is much used in the classification of the grasses. The blade is long and narrow, with a stout vein through the middle called the midrib, and smaller veins on each side parallel to the midrib.

The flowers of the grasses are variously arranged in *panicles* (for an illustration of a panicle see plate IX or plate XIX) or *spikes* (see plates I and II), each individual flower consisting of what are called the essential organs and the protecting organs, which simply enclose and protect the essential organs. These last consist of *stamens* and a *pistil*, which may both occur in the same flower, when it is said to be *perfect*, or one flower may contain only the stamens and another only the pistil. Flowers in the former case are said to be *staminate* or *sterile*, in the latter, *pistillate* or *fertile*. When the

staminate and pistillate flowers are on the same plant, it is said to be *monœcious*, but when they are on separate plants they are said to be *diœcious*.

The pistil consists of three parts, an *ovary*, a *style* and a *stigma*. The ovary contains the *ovule* or the rudimentary seed, and from the top of the ovary two styles extend upwards with feathery stigmas at their tops. The flowers are usually furnished with two or three minute scales (*squamulæ*) near the base of the pistil. The stamens consist of a long, slim, thread-like body called the *filament*, which arises near the base of the ovary, and to its outer end is attached the *anther*, a sort of case deeply notched at each end, and within which is a cavity on each side, in which the *pollen*, or fertilizing powder, is developed. There are usually three stamens in each flower, though sometimes only one or two. When the pollen is mature, the sides of the anther split open lengthwise, and the pollen is scattered by the wind, and falling on the feathery stigma of the pistil, fertilizes the ovule within, so that it developes into a seed capable, under favoring circumstances, of producing another and similar plant. These pollen grains are composed of an outer, somewhat hard and roughened covering, within which is a separate but delicate sack-like lining filled with a dense fluid often containing a large number of minute granules. When a grain of pollen falls on the stigma, it absorbs moisture, bursts the outer covering, and the inner sack extends down through the tissues of the style in the form of a long fine tube, still holding the granular contents of the original pollen grain. This tube penetrates the ovary, and coming in contact with the ovule, fertilizes it, probably by the contents of the tube passing through and mingling with those of the ovule.

The protecting organs are somewhat chaffy and scale-like in appearance, and consist of an outer pair, one on each side, called *glumes*, *outer glumes* or *lower glumes*, within which are one or more *flowers*, each of which is enclosed within another pair of protecting organs, the lower or outer one of which is called the *flowering glume*, and the one on the opposite side, the edges of which are often enclosed by the flowering glume, is called the *palea* or *palet*. See plate XXXV, *a*, which represents the pair of glumes widely separated at the top, and the flower represented as separated and raised above the glumes, showing the large flowering glume on the right, the smaller palea on the left, and three stamens, two on the right within the flowering glume, and one on the left above the

palea. In the middle, between the flowering glume and palea, is seen the top of the pistil, from which arises a pair of styles with feathery stigmas. At the base of the flower two hairy or feather-like bodies are seen, which are considered rudimentary or undeveloped flowers.

Sometimes one or more of the protecting organs are wanting, and there are frequently longer or shorter rough, bristle-like bodies called *awns*, arising from the back or tip of one or more of these protecting organs, as shown in plate XXX, *b*, and plate XXXVIII. The glumes with their included flowers form what is called a *spikelet*, which may comprise a single flower (plate X, *a*.) or several, as in plate XIX, where the enlarged spikelet shows a pair of glumes at the bottom, within and above which are seven flowers, showing only the flowering glume of each and five stamens emerging from the flowers. The axis, or continuation of the branch along which the flowers of the spikelet are arranged alternately, is called the *rachis* or *rhachis*.

The only plants with which the grasses are liable to be confounded are the sedges (*Cyperaceæ*) and the rushes (*Juncaceæ*). They may be readily distinguished from the sedges by the arrangement of the leaves. In the grasses, as already explained, they arise one from each joint, but from opposite sides of the stem. In the sedges there is also one leaf from each joint, but they are separated by one-third of the distance around the stem, so that the fourth leaf comes direct over the first, instead of the third, as in the grasses. The sheaths of the leaves of the grasses are split on the side opposite the blade, while those of the sedges are entirely close, forming a complete cylinder from the node up to the blade. The stems of the sedges are for the most part solid, and many of them are triangular, but the most ready method of distinguishing them is by the sheath. If this is closed, forming a complete cylinder around the stem, it is a sedge, but if split on the side opposite the blade, it is not a sedge. The sedges grow abundantly in open swampy lands, and form the bulk of that poor kind of hay which in some parts of the State is called "fresh grass" or "meadow hay."

The rush family includes the bog-rushes or bull-rushes which no farmer would ever mistake for a grass, and the wood-rushes (*Luzula*), of which there are two quite common species in this State growing in pastures and worn-out lands, and a third species found on mountains, but not common. The two common species are small, less than a

foot in height, and while the flowers of the grasses have four chaffy or husk-like scales for protecting organs, the wood-rushes have six separate pieces in the protecting organs, and they have three hairy stigmas while the grasses have but two.

Definition of Terms Used in Describing the Grasses.

Abortive. Imperfectly formed or rudimentary.
Alternate. Situated regularly one above the other on opposite sides.
Annual. Living but one season.
Anther. The essential part of the stamen, which contains the pollen.
Apex. The top or extreme end of any part.
Appressed. Pressed together, not spreading.
Aristate. Having an awn or beard.
Articulated. Connected by a joint or joints.
Ascending. Rising obliquely from the ground.
Awn. A bristle-like hair proceeding from the glumes.
Axis. The central stem of a panicle, spike, or spikelet, on which the flowers are disposed.
Beard. A long slender hair or awn.
Biennial. Living through two seasons.
Bifid. Divided into two portions at the apex.
Blade. The expanded portion of a leaf.
Boat-shaped. Folded together in the form of a boat, convex on the outside and concave within.
Branch. A division of the stem or of the panicle.
Branchlet. A secondary division of the branch.
Bristles. Short, stiff hairs.
Bulbous. Thickened like a bulb.
Capillary. Hair-like, very slender.
Cartilaginous. Firm and tough, like cartilage.
Carinate. Keeled, having a prominent ridge in the center.
Chaff. The dried glumes and palets of grasses.
Chartaceous. The texture resembling paper or parchment in thickness.
Ciliate. Having the margin or nerves fringed with hairs.
Cobwebby. Bearing hairs like cobwebs.
Compressed. Flattened laterally.
Contorted. Twisted.
Convolute. Rolled together inwards from the margin.

Cornaceous. Of a horn-like consistence.
Coriaceous. Of a leathery consistence.
Culm. The stalk or stem of grasses.
Cuspidate. Ending in a sharp, stiff point.
Decumbent. Reclining on the ground, but rising at the top.
Dichotomous. Branching in twos, two forked.
Digitate. Dividing from a common point.
Dicœcious. Having the stamens and pistils on separate plants.
Diverging. Widely spreading.
Dorsal. Belonging to or growing from the back.
Emarginate. Having a notch at the end.
Entire. Without notches or divisions.
Equal. Alike in length.
Exserted. Protruded, extended beyond, standing out.
Fertile. Having perfect pistils, producing fruit.
Fibrous. Having thread-like divisions.
Filament. The stalk or support of the anther.
Filiform. Thread-like.
Flexuous. Bending freely, bending in a zig-zag way.
Floret. A name sometimes given to the flowers of grasses.
Foliaceous. Resembling a leaf.
Geniculate. Bent abruptly at an angle, like a knee.
Glabrous. Smooth, without hairs or roughness.
Glaucous. Having a light bluish-green color.
Glomerate. Clustered in small roundish heads.
Glumes. The chaff-like covering of the flowers of grasses, particularly the outer pair.
Indigenous. Growing naturally, not brought from some other country.
Internode. The space between two nodes or joints.
Involute. Rolled together inwards.
Joints. Thickenings in the stem where the leaves originate.
Keel. An elevated longitudinal ridge in the middle of a glume or palea, resembling the keel of a boat.
Lamina. The expanded portion of a leaf; the blade.
Ligule. A tongue-like appendage at the upper part of the sheath of a leaf.
Line. The twelfth part of an inch.
Membranaceous. Thin, like a membrane, generally somewhat translucent.

Monœcious. The staminate and pistillate flowers separate but on the same plant.

Midrib. The central and principal nerve or vein of a leaf or glume.

Mucronate. Abruptly tipped with a short awn or bristle.

Nerves. The ribs or veins of a leaf or leaf-like organ.

Neutral. Having neither stamens nor pistils.

Nodes. The thickened and solid places in the stems from which the leaves arise.

Ovary. That part of the pistil which contains the seed.

Ovule. The body which is destined to become a seed.

Palea or palet. The inner scale or chaff of the proper flower, placed nearly opposite and a little higher than the flowering glume.

Panicle. A branched and sub-divided stem bearing the spikelets.

Pedicel. A small branchlet bearing a spikelet.

Peduncle. The main stem or stalk of a flower spike.

Perennial. Living year after year indefinitely.

Perfect. Having both stamens and pistil in the same flower.

Petiole. The sheath or stem of a leaf.

Pistil. The central or female organ of a flower, that in which the seed is developed.

Pistillate. Having only pistils without stamens.

Pollen. The fertilizing powder contained in the anthers.

Pubescent. Clothed with short and soft hairs.

Radical leaves. Those growing from the base of the stem.

Rhachis or rachis. The axis or stem on which the flowers of a spikelet are arranged; also the common axis of a close spike or of a panicle.

Rhizoma or root-stock. A horizontal underground stem.

Ribs. Prominent nerves of the leaves or glumes.

Rugose. Wrinkled or furrowed.

Serrate. Having teeth on the margin, pointing towards the apex.

Sissile. Without a footstalk or pedicel.

Setaceous. Like a bristle.

Sheath. That part of the leaf which encloses the stalk.

Spike. A collection of sessile or nearly sessile flowers on a close, narrow axis.

Spikelet. A flower or cluster of flowers having one pair of outer glumes.

Stamen. The male organs of a flower, including the anther and filament.

Staminate. Having stamens only.

Sterile. Imperfect flowers not producing seed.

Style. That portion of the pistil which bears the stigmas at the top.

Truncate. Abruptly cut off at the apex.

The Composition of Grasses.

It might be supposed that a chemical analysis of a grass would give an accurate idea of its value as a fodder, but there are so many conditions affecting the matter, that conclusions drawn from an analysis must be taken with great caution. The same species of grass when grown in different parts of the country, or even on different soils in the same region, often gives very different percentages of the substances of which it is composed, and the analyses of the same species grown in Europe differ widely from those of this country.

Grasses, like other plants, are made up of cells or sack-like bodies which are exceedingly small and can be seen only with high powers of the microscope. These cells are at first more or less globular, and in some parts of the plant always remain so, while in others they are more or less compressed and become twelve-sided bodies. A large number of the cells become much elongated or spindle-shaped, forming the woody tissue or woody fiber of the plant. These all consist, at first, of a thin, delicate vegetable membrane, composed of a substance called cellulose, enclosing an almost transparent semifluid substance called the protoplasm. "This protoplasm is the living portion of the plant, the active vital thing which gives to it its sensibility to heat and cold, of appropriating food and increasing its size." Its exact chemical composition has not yet been determined, but it is known to be an albuminous, watery substance combined with a small quantity of ash or mineral matter. "It is probably a complex mixture of chemical compounds and not a single compound. It contains, at some time or another, all the chemical constituents of plants. Oil, granules of starch, and other organic substances are frequently present in it, but they are to be regarded as products rather than proper constituents of protoplasm." (*Bessey*). It is known to contain carbon, hydrogen, oxygen and

nitrogen, while the cell walls or cellulose contains only carbon, hydrogen and oxygen.

As the cells grow older there is a thickening of the walls, and this deposit, which is similar in composition with the original cellulose, has been called lignine. This lignine is an indigestible substance, while a part of the cellulose is capable of being digested. It might therefore happen that many of the cells of the hay would escape being crushed during the process of mastication, and as the digestive juices of the animal do not act on the surrounding mass of lignine, the albuminoids contained within would escape and be lost to the animal. This view gives weight to the impression that late-cut hay is not as valuable as that which is cut when the grass is just in blossom.

In the cells of the young and growing parts of a plant, the albuminoids are present in abundance, but in the older parts they are present in a much smaller proportion because of the increase of the lignine, and also because of the actual transfer of the albuminoids to other parts of the plant, especially to the seeds. In case of the cereals, where the seeds are the most important part, they are allowed to remain growing in the field till this transference to the seeds is completed, but in case of the grasses used for coarse fodder, where all the plant above ground serves for food, the seeds are mostly small and the larger part of them, escaping mastication, pass through the animal undigested, and their contained albuminoids are lost, and since the albuminoids are the most valuable of the food ingredients and the most expensive to produce, it is important to cut and cure the hay at the time when the plant contains the greatest amount, and at the same time when the largest possible proportion of it is in a digestible condition.

Starchy matter is abundant in plants, and is of value as a food if supplied with a requisite amount of the albuminoids, for while animals can exist on the latter alone, it is impossible for them to exist on starch, since this substance does not furnish the nitrogen necessary to build up the tissues. Starch, as well as the fats of the plants, furnish the fat of the body and are of value for fattening animals.

In the analysis of grasses there is usually given the percentages of water, ash, fat, nitrogen-free extract, crude fiber and albuminoids. The ash contains, among other substances, a large percentage of silica deposited in the substance of the cell walls, particularly those

of the outer layer or epidermis. The fat forms but a small percentage of our grasses, and the digestibility of it has not been accurately determined. The nitrogen-free extract contains starch and sugar, vegetable mucilage and a few other substances which have a composition analogous to that of starch, and probably they are equally nutritious. In addition to these, there are varying quantities of gum-like substances and lignine, which are not digestible. The crude fiber is a mixture of cellulose and lignine, and varies with the age of the plant; the older and more mature contain a larger percentage. The albuminoids, as has been said, comprise the most valuable part of the plant for food.

SYNOPSIS OF THE GENERA OF GRASSES.

1 { Spikelets with one flower only (Plate 3)..... 2
  { Spikelets with two or more flowers (Plate 19).....21

2 { Flowers arranged in panicles (Plate 19)..... 3
  { Flowers arranged in spikes (Plate 2) 13

3 { Flowers with awns (Plates 29 and 27)..... 4
  { Flowers without awns(Plate 2).....10

4 { Glumes large (Plate 35, *a*.)..... 5
  { Glumes small and unequal in length 9

5 { Flowers with a copious tuft of hairs at the base, nearly equalling the length of the flowers (Plate 9).. .....DEYEUXIA.
  { Flowers without hairs at the base of the flowering glume.... 6

6 { Flowering glume without an awn at the end
  {   Some species of AGROSTIS.
  { Flowering glume with an awn at the end 7

7 { Flowers with three stamens..... 8
  { Flowers with one stamen.....CINNA.

8 { Flowers raised above the base of the glumes on a short stem,
  {   STIPA.
  { Flowers not raised above the base of the glumes, ORYZOPSIS.

9 { Flowers with three stamens .....MUHLENBERGIA.
  { Flowers with two stamens .....BRACHYELYTRUM.

10 { Glumes present.....11
   { Glumes wanting.....LEERSIA.

11 { Flowering glume and palea very unequal in length, AGROSTIS.
   { Flowering glume and palea equal in length or nearly so.....12

12 { Outer glumes much shorter than the flowering glume, SPOROBOLUS.
Outer glumes about the same length as the flowering glume, AGROSTIS and SPOROBOLUS.

13 { Flowers with awns 14
Flowers without awns 20

14 { Spikes solitary 15
Spikes two or more ..... ANDROPOGON.

15 { Spikes simple or nearly so 16
Spikes paniculate or lobed 18

16 { Involucre of two or more bristles ..... SETARIA.
Involucre none 17

17 { Flowering glumes with awns from one to three times their length ..... ALOPECURUS.
Flowering glumes with awns five times their length, HORDEUM.

18 { Flowers without awns ..... HIEROCHLOA.
Flowers with awns 19

19 { Only the flowering glumes awned ..... MUHLENBERGIA.
Flowering glume and palea both awned .... ANTHOXANTHUM.

20 { Spikes terminal, cylindrical and solitary ..... PHLEUM.
Spikes one-sided, several ..... SPARTINA.

21 { Flowers arranged in panicles. 22
Flowers arranged in spikes 33

22 { Flowers with awns 23
Flowers without awns 28

23 { Flowering glume awned on the back 24
Flowering glume awned from the end 27

24 { Awn arises near the base of the flowering glume ..... AIRA.
Awn arises above the middle of the back of the flowering glume 25

25 { Awn arises near the middle and twisted ..... TRISETUM.
Awn arises at or near the apex, not twisted 26

26 { Spikelets from three to six flowered (Plate 29) ..... AVENA.
Spikelets from five to twelve flowered (Plate 22) ... BROMUS.

27 { Awn twisted and arising from a cleft at the end of the flowering glume ..... DANTHONIA.
Awn not twisted, arising from the end which is not cleft, FESTUCA.

28 { Glumes very unequal in length.....PANICUM.
{ Glumes equal in length or nearly so.....29

29 { Stems of the flowers, within the glumes, hairy.....30
{ Stems of the flowers not hairy.....31

30 { Hairs as long as the flowers or nearly so.....PHRAGMITES.
{ Hairs much shorter than the flowers.....GRAPHEPHORUM.

31 { Spikelets much flattened.....BRIZOPYRUM.
{ Spikelets only slightly flattened.....32

32 { Outer glumes longer than the flowering glume ... PHALARIS.
{ Outer glumes equal to, or shorter than the flowering glumes, 33

33 { Flowering glume from five to seven nerved.....GLYCERIA.
{ Flowering glume from one to five nerved.....POA.

34 { Stem with only one spike.....35
{ Stem with more than one spike.....37

35 { Spikelets arranged alternately on each side.....36
{ Spikelets not arranged alternately.....ELYMUS.

36 { Spikelets with only one glume.....LOLIUM.
{ Spikelets with two glumes.....TRITICUM.

37 { Glumes present.....38
{ Glumes wanting.....GYMNOSTICHIUM.

38 { Spikes slender, terminal.....CYNODON.
{ Spikes somewhat globose, terminal and lateral....DACTYLIS.

Family—GRAMINEÆ. (Grass Family.)

Genus LEERSIA, Solander.

Le-er'-si-a.

Named in honor of J. D. Leers, a German botanist.

The spikelets are one-flowered without lower glumes, and more or less crowded into one-sided, panicled spikes, in which they overlap each other more or less. The flowering glume is of the texture of paper, strongly flattened, awnless and with minute sharp bristles along the keels. The palea is of about the same length as the flowering glume, but not more than half as wide, and similarly beset with minute bristles. Only one species of this genus has as yet been reported in this State.

1. Leersia oryzoides, Swartz.

Le-er'-si-a o-ry-zoi'-des.

Common Names. Rice Cut-Grass, White Grass, Cut Grass, False Rice, Prickle Grass.

Perennial. The stems are from two to four feet high, reclining on the ground but rising near the top (decumbent); leaves from two to three lines wide, frequently a foot or more long, very rough with minute prickles along the edges and veins, while the sheaths have the prickles arising from between the veins; joints (nodes) densely covered with bristly hairs; panicles loosely branched, the lower part often covered by the sheath of the upper leaf. Spikelets somewhat spreading, flattened, from two and a half to three lines long and of a whitish color. Flowers in August and September.

This grass is common in wet places, but is not regarded of much value, yet cattle will eat it when they can get nothing better. From all accounts of its value it would seem desirable to raise some other grass in its place. I am not aware that any analysis has been made of it, or that it has been subjected to any accurate feeding tests.

Genus Alopecurus, Linneus.

Al-o-pe-cu'-rus.

From the Greek, *alopex*, a fox, and *oura*, a tail; in allusion to the form of the spike.

The flowers are arranged in a dense, cylindrical and soft spike. Spikelets one-flowered; glumes nearly equal, boat-shaped, keeled and without awns; flowering glume with an awn which arises below the middle of the back; palea wanting; stamens three. Two species belonging to this genus are known to occur in Maine.

2. Alopecurus pratensis, Linneus.

Al-o-pe-cu'-rus pra-ten'-sis.

PLATE I.

Common Names. Meadow Foxtail, Common Foxtail Grass.

Perennial. The stems are erect and smooth, about two feet high, but in rich soil they sometimes reach three feet or even more. Leaves smooth and flat, the upper one shorter than its inflated

sheath. Spike cylindrical, obtuse, and of a yellowish green color; glumes acute, somewhat hairy; flowering glume about the same length as the outer glumes, with an awn about twice the length of the flower, arising from below the middle of the back.

This species was introduced from Europe and flowers in June and July.

This grass is rarely cultivated in this State, and perhaps for field culture will never prove as desirable as some other species, for the reason that it seldom grows more than two feet high and would not yield more than a ton to the acre, and also that it flowers so early that other grasses growing with it would not be ready to cut when this is in the best condition for hay. There is little doubt, however, that it is one of our best grasses for pastures because it endures the cropping of cattle and sheep remarkably well, and also yields a good second crop. It does not thrive well on dry, sandy soils, but is best adapted to moist, rich lands, and requires three or four years to become established and reach full perfection. In England it is regarded one of the most valuable pasture grasses, both on account of the earliness and abundance of its leafy produce, as well as from the rapid reproduction of the same when continuously eaten or cut down, and the avidity with which it is eaten by all herbivorous animals.

A chemical analysis of this grass made at the Department of Agriculture in Washington gave the following percentages: ash 7.75, fat 3.36, nitrogen-free extract 54.30, crude fibre 23.78, albuminoids 10.81. This analysis was made from grass grown in Washington and cut when it was in bloom.

3. Alopecurus geniculatus, Linneus.

Al-o-pe-cu'-rus gen-i-cu-la'-tus.

Common Names. Floating Foxtail, Water Foxtail Grass.

Perennial. Stems from twelve to eighteen inches high, ascending, bent at the lower joints; leaves smooth and flat, the upper one as long as its sheath. Spike slender; glumes obtuse, flowering glumes rather shorter than the outer glumes, awn extending half its length outside of the flower.

This species, which does not appear to be very common in this State, is found along the margins of pools and in wet places, often standing in the water, and flowers in June. Flint, in his Grasses

and Forage Plants, states that it is not much relished by stock of any kind, while it yields but a small amount of herbage, but this statement needs to be verified. *Alopecurus aristulatus*, Michx., now regarded as a variety of the above, occurs in Maine.

Genus PHLEUM, Linneus.

Phle'-um.

An ancient Greek name.

The flowers are crowded into a dense, cylindrical spike; spikelets one-flowered; glumes equal in length and with a short awn or bristle on the end of each; flowering glume and palea without awns; stamens three. This genus is represented in Maine by only one species.

4. PHLEUM PRATENSE, Linneus.

Phle'-um pra-ten'-se.

PLATE II.

Common Names. Timothy, Herds-Grass.

This perennial grass grows from two to four feet high and has a cylindrical spike from three to six inches long on the top of the stem. The glumes are of equal length and tipped with a short bristle or awn, and there is a row of fine bristles along the back. This well-known grass is more extensively cultivated in this State than any other species, and is the favorite grass, especially for horses.

Specimens of this grass, grown on heavy, clayey loam on the College farm at Orono, were cut when in full blossom and analyzed by Prof. W. O. Atwater, who obtained the following percentages: Ash 4.35, albuminoids 7.12, crude fiber 33.28, nitrogen, free extract, 53.29, fat 1.96. The average of nine different analyses made of this species cut in different stages of the growth, from Maine, New Hampshire and Connecticut, differ but little from the above.

Genus SPOROBOLUS, R. Brown.

Spo-rob'-o-lus.

Derived from the Greek, *spora*, a seed, and *ballo*, to cast out, in allusion to the fact that their seeds fall as soon as mature.

Spikelets containing one, or rarely two flowers, in an open or contracted panicle. Glumes unequal, the lower one much shorter than the upper; flowering glume and palea about equal in length.

Two species belonging to this genus are known to occur in Maine.

5. Sporobolus cuspidatus, Torrey.

Spo-rob'-o-lus cus-pi-da'-tus.

Common Names. None.

This grass has a slender, erect stem, from six to twelve inches high. The glumes are very acute and much shorter than the flowering glume and palea. These last are nearly equal in length, but the flowering glume is tipped with a sharp, stiff point (cuspidate).

This species was found at St. Francis, in Northern Maine, by Miss Kate Furbish of Brunswick. It is too small and fine to be of any great value to farmers.

6. Sporobolus serotinus, Gray.

Spo-rob'-o-lus ser-ot'-i-nus.

Common Name. Late-Flowering Sporobolus.

Stems very slender and erect, from eight to fifteen inches high. Spikelets very minute (scarcely half a line long), on very fine branchlets. Glumes ovate and obtuse, about half the length of the flowering glume.

This very delicate grass grows in sandy, wet places, and flowers in September. It is of no especial agricultural value.

Genus Agrostis, Linneus.

A-gros'-tis.

From the Greek, *agros*, a field, in allusion to the place of growth.

Spikelets one-flowered, and arranged in a spreading or contracted panicle. Glumes nearly equal, the lower one rather longer than the upper; the flowering glume is rather shorter than the lower glumes, and in some species has a short awn on the back. The palea is often minute and sometimes wanting. Four species of Agrostis are known to grow in this State and they are all of greater or less value.

7. Agrostis perennans, Tuckerman.

A-gros'-tis pe-ren'-nans.

Common Name. Thin-Grass.

Stem erect, from a bent joint near the base, from one to two feet high. Panicle spreading, pale green; the branches short, divided

and flower-bearing below the middle. Flowering glume without an awn or rarely short awned, shorter than the lower glumes; palea minute or wanting.

This grass grows in damp, shady places, and flowers in July.

8. Agrostis scabra, Willdenow.

A-gros'-tis sca'-bra.

Common Names. Hair-Grass, Fly-Away Grass, Tickle Grass.

Stem very slender, erect, from one to two feet high. Flowers in a very loose, purplish panicle; the long, slim branches bear flowers at and near the end. Glumes very acute, the lower one somewhat longer than the upper one; flowering glume usually awnless, rarely with a short awn; palea wanting. The branches of the panicle and the back of the glumes are roughened with very minute bristles, because of which it received the specific name *scabra*, meaning rough. This grass is remarkable for the long and fine branches of the very loose panicle.

Common in dry places. Flowers in July and August.

Flint states that it is of no agricultural value, and Gould says that cattle dislike it.

9. Agrostis canina, Linneus.

A-gros'-tis ca-ni'-na.

PLATE III.

Common Names. Brown Bent-Grass, Dog's Bent-Grass, Mountain Red-Top.

Stem from ten to eighteen inches high, erect; the lower leaves bristle form, with their edges rolled in, those of the stem flat and wider. Panicle spreading; glumes nearly equal in length, very acute; flowering glume shorter than the lower glumes and with a very fine awn arising from the middle of the back and extending a little beyond the end of the glumes; spikelets brownish or purplish, rarely greenish.

A variety of this species called *alpina*, with a shorter and more spreading panicle, grows on mountain tops.

This grass grows mostly in mountainous regions, though sometimes in poor, wet, peaty soil. It grows in detached patches, and is seldom found in association with any other grass. Flint says it

is of no agricultural value, but it probably affords pasturage for sheep in the regions where it grows.

10. Agrostis vulgaris, Withering.

A-gros'-tis vul-ga'-ris.

PLATE IV.

Common Names. Red-Top, Herds-Grass (in Pennsylvania), Fine-Top, Burden's Grass, Bent-Grass, Rhode Island Bent.

Perennial. Stems mostly erect, sometimes bent at the base, from one to two feet high or even more, growing from creeping root-stocks, which interlace so as make a firm sod. The glumes are nearly equal in size, and smooth, except along the keel, where they are somewhat roughened. The flowering glume is awnless and a little shorter than the lower glumes, while the palea is only from one-half to three-fourths as long.

Agrostis alba, L. is now regarded as a variety of the above. It differs in having a closer panicle and a longer ligule.

Agrostis vulgaris is one of the most extensively cultivated grasses in the State. It does well on any soil, but succeeds best on moist, rich land. If fed down close it is a good forage grass for pastures, but it is very apt in poor, dry pastures to send up a fine, wiry stem which the cattle avoid.

An analysis of this grass made at the Department of Agriculture at Washington, gave the following percentages: Ash 7.27, fat 2.87, nitrogen-free extract 56.82, crude fiber 22.02, albuminoids 11.02. This analysis was made of grass grown in the Department grounds in good soil, and cut when it was in full bloom. Another analysis made of grass grown in poorer soil at the same place gave, ash 5.84, fat 5.30, nitrogen-free extract 58.49, crude fiber 20.44, albuminoids 9.95. This shows that grass grown on a rich soil yields a larger percentage of the albuminoids than that grown on poor soil. This fact, together with that of an increased quantity of hay, is a strong argument in favor of high cultivation for our grass lands.

Genus Cinna, Linneus.

Cin'-na.

Derivation unknown.

Spikelets one-flowered, much flattened, in an open, spreading panicle; glumes narrow, acute, strongly keeled and beset with

bristles, the upper somewhat longer than the lower; flowering glume raised slightly above the base of the inside of the lower glumes, and bearing a short awn on the back just below the apex; palea slightly shorter than the flowering glume. Stamen one.

11. Cinna arundinacea, Linneus.

Cin'-na a-run-di-na'-ce-a.

PLATE V.

Common Name. Wood Reed Grass.

Stem erect, from three to six feet high; leaves a foot long and nearly half an inch wide; ligule conspicuously long. Panicle from six inches to a foot in length, rather dense, the branches spreading in flower and erect afterwards.

This grass grows in moist woods and shady swamps, flowering in August and September. It would furnish a large amount of fodder, but no experiments have been made to cultivate it for the purpose of ascertaining its value.

An analysis made of specimens of it collected in Indian Territory, gave, at the Department of Agriculture, the following percentages: Ash 6.69, fat 2.98, nitrogen-free extract, 54.47, crude fiber 29.64, albuminoids 6.22. We are not informed what stage it was in when collected, but the percentage of the albuminoids is high enough to make it deserving of further investigation.

Genus Muhlenbergia, Schreber.

Mu-len-ber'-gi-a.

Named in honor of Dr. Muhlenberg, a distinguished American botanist.

Spikelets one-flowered, arranged in contracted or rarely open panicles; glumes mostly bristle-pointed or acute, the lower one rather smaller than the upper one, or minute; flowering glume from three to five-nerved, mucronate or awned, sometimes with a long, fine awn from the apex between two short teeth, frequently somewhat hairy at the base; palea nearly the same length as the flowering glume in some species but shorter in others. Stamens three. There are three species of this genus in Maine, which may be separated by the following synopsis:

1 { Flowering glume *sharp-pointed* at the tip..... 2
  { Flowering glume with an *awn* at the tip.....*M. sylvatica.*

2 { Lower glumes *with* awns at the tip. .....*M. glomerata.*
  { Lower glumes *without* awns at the tip .....*M. Mexicana.*

12. MUHLENBERGIA GLOMERATA, Trinius.

Mu-len-ber'-gi-a glom-e-ra'-ta.

PLATE VI.

Common Names. Spiked Muhlenbergia, Cluster-Spiked Muhlenbergia, Clustering Muhlenbergia.

Stems erect, from one to three feet high, seldom branching. Panicle from two to four inches long, composed of numerous, close clusters of flowers, forming an interrupted, glomerate spike. Glumes long, narrow and acute, equal in length, each tapering into an awn as long as the glume; flowering glume and palea unequal in length, much shorter than the glumes.

This grass grows on wet, swampy lands, and flowers in August. Dr. Vasey says that it is utilized as one of the native products of wet meadows in the making of what is called wild hay, and in Colorado and Kansas is recommended as an excellent grass for hay. Specimens from Minnesota were analyzed at the Department of Agriculture and yielded ash 15.02, fat 5.77, nitrogen-free extract, 41.21, crude fiber 17.68, albuminoids 20.32. This exceedingly high percentage of the albuminoids is certainly deserving of attention, and this species should be investigated in this State, for we are liable to find among our wild grasses some which will prove of great value.

13. MUHLENBERGIA MEXICANA, Trinius.

Mu-len-ber'-gi-a Mex-i-ca'-na.

PLATE VII.

Common Names. Wood Grass, Mexican Muhlenbergia.

Stems decumbent (reclining on the ground, the ends inclining to rise), two or three feet high, very much branched, from scaly creeping root-stocks. Panicles along the side and at the end of the stems, sometimes partially enclosed by the sheaths of the leaves. Glumes nearly equal in length, without awns but sharp-pointed, a little shorter than the flowering glume and palea, which are very acute and of equal length.

This grass grows in wet grounds and moist woods, and flowers in August.

Flint says that cattle eat it very readily, and as it blossoms late in the season it is of some value, though it is frequently regarded as a troublesome weed because of its spreading root-stocks and difficult removal.

The analysis of this grass made in Washington, of specimens from Pennsylvania, gave ash 4.33, fat 2.69, nitrogen-free extract 65.47, crude fiber 22.69, albuminoids 4.82.

14. Muhlenbergia sylvatica, Torrey and Gray.

Mu-len-ber'-gi-a syl-vat'-i-ca.

PLATE VIII.

Common Names. Wood Grass, Wood Muhlenbergia.

Stems ascending, much branched, growing from two to four feet high. Panicles contracted, many-flowered; glumes nearly equal in length, bristle-pointed; flowering glume with an awn from the tip two or three times as long as the spikelet.

Grows in drier places than the preceding, and flowers in August or September.

Genus Brachyelytrum, Beauvois.

Brach-y-e-ly'-trum.

Derived from the Greek, *brachys*, short, and *elytron*, a covering; in allusion to the short glumes. Spikelets one-flowered, with a conspicuous club-shaped body half as long as the palea arising on one side. Glumes very small, unequal in length, the lower almost obsolete; flowering glume five-nerved and ending in an awn which is twice as long as the flower; palea equal to the flowering glume in length. Stamens two.

15. Brachyelytrum aristatum, Beauvois.

Brach-y-e-ly'-trum a-ris-ta'-tum.

Common Names. Awned Brachyelytrum.

Stem simple, from two to three feet high, clothed with fine hair about the joints; leaves six inches long and from four to six lines wide, somewhat hairy. Panicle erect.

Common in rocky woods. Flowers in June and July.

Genus DEYEUXIA, Clarion.

Dey-eux'-i-a.

Spikelets one-flowered, in a contracted or open panicle. Glumes nearly equal in length, keeled, but without an awn; flowering glume hairy at the base, nearly as long as the lower glume and usually with a short, fine awn from the back, which is scarcely distinguishable from the hairs. Stamens three. There is also a small, hairy appendage at the base of the flowering glume, which is considered to be the rudiment of a second flower. Calamagrostis of the older books.

16. DEYEUXIA CANADENSIS, Beauvois.

Dey-eux'-i-a Can-a-den'-sis.

PLATE IX.

Common Names. Blue Joint-Grass, Small Reed-Grass, Canadian Small-Reed.

Stem erect, from three to five feet high; leaves a foot or more long and from a quarter to nearly half an inch wide. Panicle open and somewhat spreading, from four to six inches or more long and from two to three inches in diameter, generally of a purplish color. The spikelets are on short stalks; glumes nearly equal in length, acute and awnless; flowering glume with long white hairs from the base and also from the appendage, which reach nearly to the end, and there is a fine, inconspicuous awn arising from the back which only reaches as far as the apex. The palea is about two-thirds as long as the flowering glumes. Very common in wet places, and flowers in August.

This grass is deserving of more attention than it has generally received from the farmers in Maine. It is greedily eaten by stock in the winter, and is thought, by those who have used it most, to be as nutritious as Timothy. A chemical analysis of this species cut in Massachusetts, when in blossom, by Prof. Storer of the Bussey Institution, gave ash 4.65, fat 2.33, nitrogen-free extract, 41.23, crude fiber 44.34, albuminoids 7.45. This analysis certainly promises quite as much for this grass as has been claimed for it by those who have cut it for hay and fed it to their stock.

It seems to be a very desirable grass to grow on wet, boggy lands which are not drained.

Genus Ammophila, Host.

Am-moph'-i-la.

Derived from the Greek, *ammos*, sand, and *philos*, a lover; in allusion to its growing on sandy beaches.

Flowers arranged in a dense, cylindrical, spiked panicle. Glumes nearly equal and keeled. Flowering glume and palea somewhat shorter than the outer glumes, keeled and awnless. The base of the flowering glume is beset with short hairs at the base. Leaves rolled up from their edges (convolute).

17. Ammophila arundinacea, Host.

Am-moph'-i-la a-run-di-na'-ce-a.

Common Names. Sea Sand-Reed, Common Sea-Reed, Beach Grass, Mat Grass.

This is named *Calamagrostis arenaria*, Roth., in the older books,

Stems erect, rigid and solid, from two to three feet high; leaves long and smooth, tapering to a point and with their edges rolled in. Panicle from six to twelve inches long, of a whitish color, very close and spike-like. Spikelets very much compressed, about half an inch long; glumes nearly equal in length, the lower one with a single nerve, the upper with three nerves. Flowering glume and palea similar to the outer glumes, but slightly shorter, the hairs at the base less than one-third of their length. Anthers long and yellow.

Common on sandy beaches along the coast. Flowers in August. Its long creeping root-stocks and fibrous roots enable it to confine the loose sands of the beach from being washed away by the sea, and it has been planted for this purpose in Holland, France and other countries of Europe, as well as on Cape Cod and other places in this country. It is of no value as a fodder.

Genus Oryzopsis, Michaux.

O-ry-zop'-sis.

Derived from the Greek, *oryza*, rice, and *opsis*, resemblance; because of its resemblance to rice.

Spikelets one-flowered; glumes equal in length, partly membranaceous and without awns. Flowering glume generally awned at the tip; palea nearly of the same length as the flowering glume. Three

long scales arise from the base of the ovary. Two species belonging to this genus occur in this State and may be distinguished as follows:

Awn about twice the length of the glumes..... *O. asperifolia.*
Awn very short or wanting..... .....*O. Canadensis.*

18. Oryzopsis asperifolia, Michaux.

O-ry-zop'-sis as-per-i-fo'-li-a.

Common Names. White Mountain-Rice, Large White-Grained Mountain-Rice.

Stems erect, from nine to eighteen inches high with sheaths bearing only rudimentary leaves on the upper part of the stem, those from the base bearing long and rigid leaves which are rough on the edges, pale beneath and lasting through the winter. The panicle or raceme has but few flowers. The awn arising from the tip of the flowering glume is from two to three times as long as the glume. The scales arising from the base of the grain are narrow and almost as long as the palea. "The large seeds make a very white and fine flour, but the grain drops so easily that it is impracticable to gather it in large quantities." Flint.

Common in dry woods, and flowers in June.

19. Oryzopsis Canadensis, Torrey.

O-ry-zop'-sis Can-a-den'-sis.

Common Names. Canadian Rice, Smallest Oryzopsis.

Stems slender, from six to fifteen inches high, the lowest sheaths bearing developed leaves, the upper ones with the leaves rudimentary and all of them have their edges rolled in (involute—thread-shaped). Panicle from one to three inches long, the branches usually in pairs. The flowering glume is whitish and clothed with fine, short hairs, and the awn at the tip is short, easily falls off, and is sometimes wanting.

This rare species grows on rocky hill-sides and in dry places, and flowers in June.

Nothing is known of the value of this grass.

Genus Stipa, Linneus.

Sti'-pa.

From the Greek, *stupe*, a feathery material, in allusion to some of the beautifully feathered awns in some of the species.

Spikelets one-flowered. Glumes membranaceous, shorter than the flowering glume, and without awns: flowering glume somewhat coriaceous or leathery, with a long, twisted awn at its apex. Stamens mostly three. Only one species has thus far been reported in this State.

20. Stipa Richardsonii, Link.

Sti'-pa Rich-ard-so'-ni-i.

Common Name. Richardson's Feather.

Stem erect, from eighteen inches to two feet high; leaves slender. Panicle loose, from four to five inches long, with slender, few-flowered branches; glumes nearly equal in length, oblong acute, two and one-half lines long, about equal in length to the pubescent, linear-oblong flowering glume, which bears a twisted awn from half to three-fourths of an inch long. Reported by C. J. Sprague as occurring on Pleasant Mountain, near Sebago Lake.

This grass is said to be worthless as a forage plant.

Genus Spartina, Schreber.

Spar-ti'-na.

From the Greek, *spartine*, a cord; in allusion to the cord-like appearance of these grasses.

Panicle composed of several separate, triangular spikes, along one side of which the one-flowered spikelets are arranged. Glumes strongly compressed, with a rough, bristly keel, unequal in length and without awns; flowering glume membranaceous, compressed, keeled but without an awn; palea nearly as long as the flowering glume, and with two keels.

Three species are reported in this State, which may be separated as follows:

1 { Spikelets closely overlapping each other and very rough on the keels 2
  { Spikelets scarcely overlapping and nearly smooth on the keels ..... *S. stricta.*

2 { Leaves rough along the edges..... *S. cynosuroides.*
{ Leaves smooth along the edges..... *S. juncea.*

21. Spartina cynosuroides, Willdenow.

Spar-ti'-na cyn-os-u-roi'-des.

Common Names. Fresh Water Cord-Grass, Tall Marsh Grass.

Stems erect, from two to five feet high; leaves long, and tapering to a slender point. The spikes vary in number from five to twenty, scattered and spreading. Spikelets closely overlapping each other. Glumes with long, rigid, awn-like points, the lower one equalling the length of the flowering glume.

This species grows along the banks of rivers and lakes, flowering in August.

Spartina polystachya, Willd., Salt Reed-Grass, is given in the List of Maine Plants published in 1862, but there may be some mistake about this species. This grass has the stem tall and stout, from four to nine feet high and sometimes an inch in diameter at the base. The leaves are broad and roughish underneath as well as on the margins; spikes from twenty to fifty, forming a dense oblong and purplish raceme; glumes barely mucronate, the lower one half as long as the flowering glume. Grows on salt or brackish marshes, within tide-water.

These are coarse grasses and make a very inferior quality of hay, especially if not cut early.

22. Spartina juncea, Willdenow.

Spar-ti'-na jun'-ce-a.

PLATE X.

Common Names. Rush Salt-Grass, Marsh Grass, Salt Grass.

Stems slender, from one to two feet high; leaves narrow, very smooth and strongly involute (the edges rolled in). Spikes from one to five, on very short stems. Glumes acute, the lower one scarcely half the length of the upper, and not half the length of the flowering glume.

This grows on salt marshes and sea beaches, and flowers in August. It forms a large portion of the salt marshes near the sea-coast. Dr. Vasey says it makes an inferior hay called salt hay, which is worth about half as much per ton as Timothy or Red-Top.

23. Spartina stricta, Roth.

Spar-tī'-na strić'-ta.

Common Names. Salt Marsh Grass, Smooth Marsh Grass.

Stems erect, from one to four feet high, leafy to the top. Spikes from two to four except in variety *glabra*, which has from five to twelve. Spikelets loosely imbricated, or remote in variety *alterniflora*. Glumes acute, very unequal in length, the larger one a little longer than the flowering glume.

Common on salt marshes. Odor strong and rancid (Gray).

This species is greedily eaten by horses and cattle, but its strong rancid smell is said by Elliot to affect the breath, milk, butter, and even the flesh of the cattle that feed on it.

Genus Cynodon, Richard.

Cyn'-o-don.

Derived from the Greek, *kuon*, a dog, and *odous*, a tooth.

Spikelets without stems and arranged in two rows along one side of the slender spikes which are digitate (starting from one point), at the end of the stem. The spikelets are one-flowered but with the rudiments of another, in the form of a minute stem enlarged at the end, arising behind the palea and two-thirds as long.

24. Cynodon dactylon, Persoon.

Cyn'-o-don dac'-tyl-on.

PLATE XI.

Common Names. Bermuda Grass, Scutch Grass.

A low, creeping, perennial grass, with abundant short leaves at the base and with from three to five spikes. Glumes nearly equal in length and keeled; the flowering glume is boat-shaped, about equal in length to the palea but much broader. The palea is narrow and two-keeled.

This grass, so common in the South, is occasionally met with in Maine. Dr. Vasey says it has long been a chief reliance for pastures in the Southern States, and has been extravagantly praised by some and cursed by others who find it difficult to eradicate when once established. It rarely ripens any seed, and the usual method of reproducing it is to chop up the roots with a cutting knife, sow

them broadcast, and plow under shallow. An analysis made at the Department of Agriculture, of specimens from Alabama, gave ash 9.11, fat 1.57, nitrogen-free extract 52.61, crude fiber 23.29, albuminoids 13.42.

Genus GRAPHEPHORUM, Desvaux.

Graph-eph'-o-rum.

From the Greek, *graphis*, a pencil, and *fero*, to bear, from the tufts of hair at the base of the flowers.

Spikelets from two to five-flowered, in a narrow or loose panicle. Glume nearly as long as the spikelet; flowering glume slightly longer and larger than the palea. A tuft of fine hairs arises from the base of each flower.

25. GRAPHEPHORUM MELICOIDES, Beauvois.

Graph-eph'-o-rum mel-i-coï'-des.

Stem from one to two feet high; leaves rough; panicle open. Glumes nearly equal in length, lance-shaped, their midrib and stems rough; joints of the rhachis bearded on one side between the flowers.

This rare species has been reported from the shores of Moosehead Lake by C. E. Smith.

Genus DACTYLIS, Linneus.

Dac'-ty-lis.

Derived from the Greek, *dactylos*, a finger, in allusion to the form of the spike.

The spikelets contain from three to five flowers, and are in dense clusters at the ends of the short branches of a close, short panicle. Outer glumes nearly equal in length, acute, rigid and keeled, with from one to three nerves. Flowering glumes larger, more rigid, keeled, five-nerved, bristle-pointed and ciliate on the keel. Palea a little shorter than the glume, narrower, thinner and two-keeled.

26. DACTYLIS GLOMERATA, Linneus.

Dac'-ty-lis glom-er-a'-ta.

PLATE XII.

Common Names. Orchard Grass, Rough Cock's-foot, Cock's-foot Grass.

Stems erect, about three feet high, rough; leaves broadly linear and rough; branches of the panicle naked at the base. The flowering glumes are rough and end in a sharp point or short awn. They are rather longer than the outer glumes and both are sometimes tinged with purplish.

This is one of the most valuable of all our cultivated grasses. It blossoms at the same time as red clover and makes with it an admirable hay. As a pasture grass, it is more productive than any other, but does the best under close feeding, because when suffered to grow rank or old it contains far less nutriment then when younger, and cattle, sheep and horses will not touch it, though when it is younger they eat it with the greatest avidity. It is disposed to grow in tussocks, but good preparation of the land and uniform and liberal seeding is a good preventive. It succeeds well in any soil, doing especially well in moist places, and is often sown in orchards because it grows so well even in the shade of trees.

It is singular that so valuable a grass as this should be so little cultivated by our farmers. Prof. Phares says that sheep will leave all other grasses if they can find this, and, acre for acre, it will sustain twice as many sheep or other stock as Timothy; and, further, if it is cut at the proper stage it makes a much better hay than Timothy, and is greatly preferred by animals, being easier to masticate, digest and assimilate; in fact, more like green grass in flavor, tenderness and solubility. Orchard grass is considered in England one of the most valuable of hay and pasture grasses. It forms a principal constituent of all the best natural pastures and meadows.

Specimens of this grass cut in full bloom in Washington, and analyzed at the Department of Agriculture, gave ash 8.07, fat 3.24, nitrogen-free extract 53.76, crude fiber 25.40, albuminoids 9.53.

Genus Glyceria, R. Brown.

Gly-ce'-ri-a.

From the Greek, *glukeros*, sweet, in allusion to the sweetish taste of the grain.

Spikelets cylindrical (terete) or flattened, several to many-flowered in a narrow or diffuse panicle, the rhachis smooth and readily disarticulating between the flowers. Glumes shorter than the flowers, unequal in length, membranaceous, from one to three-nerved and without awns; flowering glumes obtuse, awnless, more or less hyaline and denticulate at the apex, rounded (never keeled) on the back, from five to nine-nerved, the nerves separate and all vanishing before reaching the apex; palea about as long as its glume, two-keeled, entire or two-toothed at the apex.

The Maine species may be separated by means of the following table:

1 { Leaves involute (the edges rolled in); growing in salt marshes ..... *G. maritima.*
{ Leaves flat; not growing in salt places 2

2 { Spikelets ovate, oblong or linear-oblong 4
{ Spikelets long and narrow 3

3 { Flowering glume obtuse, rather longer than the palea *G. fluitans.*
{ Flowering glume acute, shorter than the palea, *G. acutiflora.*

4 { Panicle open and spreading 6
{ Panicle long and slim 5

5 { Spikelets three or four-flowered ..... *G. elongata.*
{ Spikelets six or seven-flowered ..... *G. obtusa.*

6 { Flowering glume acute or blunt-pointed, longer than the rounded palea ..... *G. Canadensis.*
{ Flowering glume truncate-obtuse; palea two-toothed 7

7 { Stems from three to five feet high; leaves large, *G. aquatica.*
{ Stems from one to three feet high; leaves medium 8

8 { Spikelets numerous, bright green ..... *G. nervata.*
{ Spikelets usually few, pale green ..... *G. pallida.*

27. Glyceria Canadensis, Trinius.

Gly-ce'-ri-a Can-a-den'-sis.

PLATE XIII.

Common Names. Rattlesnake Grass, Tall Quaking Grass.

Stems erect and stout, from two to three feet high; leaves long and somewhat rough. Panicle large, loose and finally nodding, from six to nine inches long. Spikelets oblong to ovate, one-sixth of an inch long, rather swollen but flattened on the sides, from six to eight-flowered. Glumes shorter than the flowers and purplish; flowering glume somewhat longer than the rounded palea.

This species grows in wet meadows and swamps, and flowers in July. Hon. J. S. Gould says that cattle eat it very well in pasture and when made into hay. It is well adapted to low, wet lands.

28. Glyceria obtusa, Trinius.

Gly-ce'-ri-a ob-tu'-sa.

Common Name. Obtuse Spear Grass.

Stems stout and erect, from two to three feet high, very leafy; leaves long and smooth. Panicle narrowly oblong and dense, from three to five inches long; spikelets from six to seven-flowered, nearly one-fourth of an inch long; flowering glume obtuse.

Grows in bogs near the coast, and flowers in August.

29. Glyceria elongata, Trinius.

Gly-ce'-ri-a e-lon-ga'-ta.

Common Name. Long-Panicled Manna-Grass.

Stems erect, simple, from three to four feet high; leaves about one foot long, somewhat rough. Panicle elongated, nearly a foot long and nodding, appressed; flowering glume obtuse.

Grows in wet woods and swamps. Flowers in July.

30. Glyceria nervata, Trinius.

Gly-ce'-ri-a ner-va'-ta.

PLATE XIV.

Common Names. Nerved Meadow Grass, Nerved Manna-Grass. Sometimes called Fowl Meadow Grass, but this name should only be given to *Poa serotina*.

Stems erect, from three to four feet high; leaves rather long. Panicle diffuse and at length drooping, the very numerous small spikelets ovate-oblong, from three to seven-flowered. Flowering glume truncate-obtuse, strongly seven-nerved; palea with two teeth at the apex.

Common on the margin of ponds and in wet meadows. Flowers in July.

This will undoubtedly prove a valuable grass for moist ground, and is said to succeed well on light upland soils also. It is nutritious and might be advantageously mixed with other grasses in low lands.

An analysis of this grass made at the Department of Agriculture, from specimens cut in New Hampshire, gave the following percentages. Ash 6.80, fat 2.91, nitrogen-free extract 60.01, crude fiber 21.97, albuminoids 8.31.

31. Glyceria pallida, Trinius.

Gly-ce'-ri-a pal'-li-da.

Common Name. Pale Manna-Grass.

Stems slender, from one to three feet high, ascending from a creeping base in shallow water; leaves short, sharp-pointed and pale. Branches of the rather simple diffuse panicle erect, spreading and rough; spikelets few, from five to nine-flowered and pale; flowering glume minutely five-toothed, the palea lance-shaped, conspicuously two-toothed.

This common species flowers in July. The seeds are gathered in Holland as an article of food.

32. Glyceria aquatica, Smith.

Gly-cé'-ri-a a-quat'-i-ca.

PLATE XV.

Common Names. Reed Meadow Grass, White Spear Grass.

Stems erect and stout, from three to five feet high; leaves a foot or more long and often half an inch wide. Panicle much branched, from eight to fifteen inches long, the numerous branches ascending and spreading with age; spikelets oblong, from five to nine-flowered, usually purplish; flowering glume entire and obtuse.

Common in wet grounds. Flowers in July.

It is said that this grass is liked by cattle when made into hay.

Specimens from Vermont were analyzed at the Department of Agriculture and gave ash 7.30, fat 2.20, nitrogen-free extract 56.77, crude fiber 25.60, albuminoids 8.13.

33. Glyceria fluitans, R. Brown.

Gly-cé'-ria flu'-i-tans.

Common Names. Floating Manna Grass, Common Manna Grass.

Stems erect or ascending, compressed, from three to five feet high; leaves from eight to twelve inches long, smooth and often floating on the surface of the water, when young. Panicle contracted, from eight to twelve inches long, the lower part somewhat concealed by the sheath of the upper leaf. Spikelets from seven to thirteen-flowered; flowering glume oblong, obtuse, or the scarious tip somewhat acutish, entire or obscurely three-lobed, usually rather longer than the blunt palea.

Common in shallow water on the margins of ponds and rivers. Flowers from June to August. It is said that this grass will bear cultivation in moderately dry grounds. There is great difference of opinion with respect to the value of this grass; some state that it is relished by cattle, while others deny this. It is evident that there is need of more careful observation and experiment before we can form opinions of its value.

34. GLYCERIA ACUTIFLORA, Torrey.

Gly-ce'-ria a-cu-ti-flo'-ra.

Common Names. Pointed Spear-Grass, Sharp-Flowered Manna-Grass.

Stems erect, somewhat compressed, about a foot and a half high; leaves from three to six inches long. Panicle long and narrow; spikelets from five to twelve-flowered, few and scattered; flowering glume oblong-lanceolate, acute, shorter than the long, tapering point of the palea.

This rare species grows in wet places, and flowers in June.

35. GLYCERIA MARITIMA, Wahlenberg.

Gly-ce'-ri-a ma-rit'-i-ma.

Common Name. Sea Spear Grass.

Flowering stems erect, from a foot to a foot and a half high, the sterile shoots runner-like; leaves mostly folded and compressed; branches of the panicle solitary or in pairs. Spikelets oblong or linear, from four to eight-flowered; flowering glume rounded at the upper end, slightly hairy at the base.

Common on salt marshes along the coast. Flowers in July.

Genus DISTICHLIS, Rafinesque.

Dis-tich'-lis.

Derived from the Greek, *distichos*, two rows, in allusion to the arrangement of the flowers on the spike. Spikelets dioecious, many-flowered, compressed, crowded in a dense spicate, capitate, or rather open panicle; glumes herbaceous and narrow, keeled, acute, shorter than the flowers; flowering glume herbaceous or membranaceous, keeled, many-nerved, acute; palea complicate, two-keeled, the keels narrowly winged. The pistillate flowers are more rigid than the staminate.

36. DISTICHLIS MARITIMA, Rafinesque.

Dis-tich'-lis ma-rit'-i-ma.

PLATE XVI.

Common Names. Spike Grass, Salt Grass, Marsh Grass.

This is described as *Brizopyrum spicatum*, Hook, in the older books.

Stems tufted from creeping root-stocks, from nine to eighteen inches high. Spike oblong, flattened, one inch long; spikelets ovate or oblong, from five to ten-flowered; the flowers smooth and naked; grain pointed.

Grows on salt marshes and beaches. Flowers in August.

Plate 16 represents this species, a, the glumes; b, the staminate or male flower, showing the flowering glume and palea separated at the top and exposing the three stamens; c, represents the pistillate or female flower.

Dr. Vasey says that it cannot be considered a first-rate grass for agricultural purposes.

Genus Poa, Linneus.

Po'-a.

From the Greek, *poa*, a grass.

Spikelets somewhat compressed, from two to ten-flowered, in an open panicle; flowers generally perfect; glumes commonly shorter than the flowers, the lower one somewhat smaller than the other; flowering glume membranaceous with a scarious margin, compressed, keeled, pointless, five-nerved, often with a loose or webby mass of hair at the base; palea about the same length as the flowering glume, prominently two-nerved or two-keeled. Stems tufted.

Five species of *Poa* are known in this State, and may be separated by means of the following table:

1 { Joints of the stem circular 2
  { Joints of the stem flattened or compressed . . . . *P. compressa.*

2 { Stems low, not over ten inches high 3
  { Stems from one to three feet high 4

3 { Mountain species; perennial . . . . . *P. laxa.*
  { Not growing on high mountains; annual . . . . . *P. annua.*

4 { Panicle elongated, purplish; ligule long . . . . . *P. serotina.*
  { Panicle short pyramidal; ligule short and blunt . . *P. pratensis.*

37. Poa annua, Linneus.

Po'-a an'-nu-a.

Common Names. Annual Spear Grass, Low Spear Grass, Suffolk Grass.

Stems low and spreading, from three to eight inches high, from an annual or biennial root; leaves pale green and tender. Panicle

often one-sided, branches single or in pairs; spikelets crowded, very short pediceled, from three to seven-flowered. Common in fields and waste grounds. Flowers from June to September. It is very nutritious but too small to be cultivated with profit.

38. Poa compressa, Linneus.

Po'-a com-pres'-sa.

PLATE XVII.

Common Names. Wire Grass, Flat-Stalked Grass, Blue Grass.

Stems from twelve to eighteen inches high, bent at the lower joints, arising from a running root-stock. The stems are very much flattened, especially the nodes, which character suggested the specific name. Leaves short and of a dark bluish color; panicle simple, contracted and somewhat one-sided, from one to three inches long, the short branches mostly in pairs. Spikelets almost sessile, from three to ten-flowered and much flattened. The outer glumes are acute, the flowering ones obtuse, smooth, the nerves obscure and the apex frequently purplish colored. It forms a very firm turf by means of its creeping root-stocks.

Common in fields and waste places. Flowers in June and July.

Various opinions are held as to the value of this grass. Hon. J. S. Gould says that cows fed upon it, both in pasture and in hay, give more milk and keep in better condition than when fed on any other grass, and that horses fed on this hay will do as well as when fed on Timothy and oats combined. Although it does not grow very high and yields scarcely more than a ton to the acre, yet, if the claims made for it by Mr. Gould prove true, it should certainly command the attention of our farmers, not only for field culture, but also for the pastures.

The analysis of this grass grown in Washington, gave the following results: Ash 6.08, fat 4.52, nitrogen-free extract, 58.18, crude fiber 18.53, albuminoids 12.69.

39. Poa laxa, Hænke.

Po'-a lax'-a.

Common Name. Few-Flowered Alpine Meadow Grass.

Stems slender, erect, from six to eight inches high; leaves numerous, narrow. Panicle somewhat raceme-like, often one-sided and

nodding; spikelets from two to four-flowered, the flowers acute, hairy and somewhat webbed at the base.

This species occurs on the tops of the higher mountains, and flowers in August.

Poa alpina, L., has been reported from Northern Maine with doubt.

40. Poa serotina, Ehrhart.

Po'-a se-rot'-i-na.

PLATE XVIII.

Common Names. Fowl Meadow Grass, False Red-Top, Duck Grass, Swamp Wire Grass.

Stems from two to three feet high; leaves flat, from three to six inches long; ligule elongated; panicle from six to ten inches long, the branches rough and flexuous. Spikelets from two to four-flowered, often tinged with dull purple; flowers and glumes narrow; flowering glume very obscurely nerved.

Wet meadows and along the border of streams. Flowers in July and August.

This grass will grow on almost every kind of soil, but it attains the greatest perfection in a rich, moist one. It never grows so coarse or hard but that the stalk is sweet and tender, and eaten without waste. It is easily made into hay and is a nutritive and valuable grass.

Specimens from Wisconsin were analyzed at the Department of Agriculture and gave, ash 4.23, fat 2.84, nitrogen-free extract, 65.81, crude fiber 20.85, albuminoids 6.27.

41. Poa pratensis, Linneus.

Po'a pra-ten'-sis.

PLATE XIX.

Common Names. Kentucky Blue-Grass, Green or Common Meadow Grass, Smooth-Stalked Meadow Grass, June Grass, Brown Top.

Stems erect, from one and a half to two feet high, sending out numerous root-stocks from the base. Panicle diffuse, pyramidal; spikelets from three to five-flowered; flowering glume five-nerved, hairy along the margins and on the keel, webbed at the base.

Common in fields everywhere. Flowers in July.

This grass has gained an almost unparalleled reputation in the West, especially in Kentucky, where it has given name to a whole section of the State—the blue-grass region—and has taken one of its common names from that State. Whatever may be its value and importance there, it surely has no such reputation in New England, and especially in Maine. For field culture, the yield per acre is much less than many other species, and further, it is attacked early in the season by a species of thrips (*Limothrips poaphagus*, Com.), a minute, orange-colored insect which conceals itself beneath the sheath of the upper leaf where it feeds on the stem just above the upper joint, completely killing the stem above, so that by haying time at least one-fourth of the grass is dead and worthless. It cannot, therefore, be advisable to cultivate this grass in Maine. It is doubtless a good grass to mix with others for lawns.

Genus Festuca, Linneus.

Fes-tu'-ca.

Latin, *Festuca*, a straw.

Spikelets from three to many-flowered; flowers not webby at the base; glumes unequal, shorter than the flowers, the lower with one nerve, the upper three-nerved, narrow, keeled acute; flowering glume membranaceous or coriaceous, narrow, rounded on the back but not keeled, more or less distinctly three to five-nerved, acute or tapering into a straight awn, rarely obtuse; palea narrow, flat, prominently two-nerved or two-keeled.

The three species now known to occur in Maine may be separated by the following table:

1 { Leaves broad and flat; flowers without awns.....*F. elatior.*
  { Leaves with their edges more or less rolled in; flowers with awns 2

2 { Stems growing from a dense tuft of leaves.....*F. ovina.*
  { Stems not growing from a dense tuft of leaves....*F. tenella.*

42. Festuca tenella, Willdenow.

Fes-tu'-ca te-nel'-la.

Common Name. Slender Fescue-Grass.

Annual; stems slender, from five to eighteen inches high; leaves convolute bristle-form. Panicle spike-like, one-sided or more com-

pound and open; spikelets from seven to thirteen-flowered; awns equal to or shorter than the flowering glumes from which they arise. Stamens two.

Grows in dry, sterile soil, and flowers in July.

43. Festuca ovina, Linneus.

Fes-tu'-ca o-vi'-na.

PLATE XX.

Common Name. Sheep's Fescue.

Perennial; stems tufted, erect, from six to eighteen inches high; leaves narrow, sometimes involute. Panicle from two to four inches long, the branches mostly single and alternate, erect and few-flowered; spikelets from three to eight-flowered; glumes acute and narrow; flowering glume lanceolate, roughish, with a short, rough awn not more than half the length of the flower, or shorter.

This species is very variable. It flowers in July.

It is said to form the great bulk of the sheep pastures of the highlands of Scotland, where it is the favorite food of the sheep and where it is believed to be more nutritious than any other grass. It is also said that the Tartars choose to encamp during the summer months where this grass is most abundant, because they believe that it affords the most wholesome food for their grazing animals, especially their sheep. It naturally distributes itself in dry, sandy, or rocky soils, where scarcely any other species would grow, and is without doubt our very best grass for sandy or rocky pastures, but would be of small value for field culture because of its diminutive size.

Specimens of this grass grown in New Hampshire and analyzed at the Department of Agriculture in Washington gave, ash 5.03, fat 4.26, nitrogen-free extract 84.18, crude fiber———, albuminoids 6.53, while specimens grown in Washington, cut in full bloom, gave, ash 5.60, fat 2.51, nitrogen-free extract 58.20, crude fiber 23.79, albuminoids 9.90.

44. Festuca elatior, Linneus.

Fes-tu'-ca e-la'-ti-or.

PLATE XXI.

Common Names. Meadow Fescue, Taller or Meadow Fescue.

Perennial. Stems erect, from three to five feet high; leaves about a foot long, sheaths smooth and loose. Panicle from six to eight inches long, erect, with short branches; spikelets crowded, from five to ten-flowered, the flowers rather remote, oblong-lanceolate; flowering glume five-nerved, either blunt, acute, or rarely with a very short awn.

Common in grass lands. Flowers in July; earlier than Timothy.

It succeeds best in moist, low grounds. Cattle are very fond of it, both green and when made into hay.

Specimens from Pennsylvania were analyzed at the Department of Agriculture in Washington, and gave ash 8.07, fat 4.07, nitrogen-free extract 51.59, crude fiber 22.50, albuminoids 13.77.

Genus Bromus, Linneus.

Bro'-mus.

From the Greek, *bromus*, a kind of oats.

Spikelets from five to many-flowered in a more or less open panicle; glumes unequal, shorter than the flowers, the lower from one to five, the upper from three to nine-nerved; flowering glume either convex on the back or compressed keeled, from five to nine-nerved, awned or bristle pointed from below the mostly two-cleft tip; palea rather shorter than the glumes, two-keeled, the keels rigid and ciliate.

Three species have been observed in Maine, and may be separated as follows:

Lower glume 3-5-nerved, the upper, 5-9-nerved . . *B. secalinus.*

Lower glume one-nerved, the upper three-nerved,

B. ciliatus and *B. asper.*

45. Bromus secalinus, Linneus.

Bro'-mus se-cal'-i-nus.

PLATE XXII.

Common Names. Cheat, Chess, Willard's Brome-Grass.

Annual. Stems from two to three feet high, the nodes swollen and covered with fine short hairs; leaves broadly linear, hairy above. Panicle spreading, at length nodding, the branches nearly simple; spikelets ovate-oblong, compressed, smooth, from eight to twelve-flowered; flowering glume rather longer than the palea, with a very short awn or awnless.

A worthless plant, too common in wheat fields.

Specimens raised in New Hampshire were analyzed in Washington, by Mr. Richardson, and gave ash 7.12, fat 4.08, nitrogen-free extract 57.30, crude fiber 23.79, albuminoids 7.71.

46. Bromus ciliatus, Linneus.

Bro'-mus cil-i-a'-tus.

Common Name. Fringed Brome-Grass.

Perennial. Stems from three to five feet high, nodes black; leaves smoothish underneath, hairy above, the lower sheaths pubescent, the upper ones smooth. Panicle compound, very loose; spikelets from seven to twelve-flowered; flowering glume with an awn at the end half its length or more; silky with closely lying hairs near the margins below.

This grass grows along river banks and in moist woods, and flowers in July and August. Not considered of any value in cultivation.

47. Bromus asper, Linneus.

Bro'-mus as'-per.

This rare grass is reported, in Gray's Manual of Botany, from Bethel, Maine. It is described as follows:—Culm (stem) slender and panicle smaller; spikelets five to nine-flowered; flowering glume linear lanceolate, scarcely keeled, hairy near the margins, rather longer than the awn; sheaths and lower leaves hairy or downy.

Genus PHRAGMITES, Trinius.

Phrag-mi'-tes.

From the Greek, *phragmitis*, growing in hedges.

Spikelets from three to seven-flowered, the flowers not very close to each other, their stems being covered with long silky threads nearly or quite as long as the flowers; lower glumes very unequal in length and the flowering glume is awl-shaped and three times as long as the upper.

48. PHRAGMITES COMMUNIS, Trinius.

Phrag-mi'-tes com-mu'-nis.

PLATE XXIII.

Common Name. Reed.

Stems erect, from five to twelve feet high, and an inch or more in diameter at the base; leaves from twelve to eighteen inches long and two inches wide. Panicle very large, loose, and somewhat nodding; spikelets from three to ——-flowered.

This is our largest grass and grows along the borders of streams and ponds. Although found widely distributed over the world, it does not appear to be very common in Maine. Flowers in August. This grass is of no value for fodder, but is used in some countries for thatching the roofs of houses, for light fences and for screens.

Genus LOLIUM, Linneus.

Lo'-li-um.

The ancient Latin name.

Spikelets several-flowered and arranged alternately at each point of the rhachis of the simple spike placed edgewise against the rhachis. Inner glume wanting, except in the upper spikelet.

49. LOLIUM PERENNE, Linneus.

Lo'-li-um pe-ren'-ne.

PLATE XXIV.

Common Names. Rye Grass, Ray Grass, Common Darnel, Italian Rye Grass, Perennial Rye Grass.

Perennial. Stems erect, from one to two feet high. Glumes shorter than the spikelet; flowers from eight to twelve in each

spikelet, with or without short awns. Fields and pastures. Introduced from Europe. Flowers in July.

This is one of the most important grasses in England, occupying the same place there that Timothy does here. Hon. J. S. Gould says that the valuable qualities of this grass may be summed up as follows: Its habit of coming early to maturity; its rapid reproduction after cutting; its wonderful adaptation to all domestic animals, which is shown by the extreme partiality they manifest for it, either alone or when mixed with other grasses, whether when used as green food for soiling, as hay or as pasturage, in which latter stage its stems are never allowed to ripen and wither like those of other grasses. One of its greatest recommendations is its beneficial influence on the dairy, not only in augmenting the flow of milk, but in improving the flavor of the cheese and butter that are made from it. Morton, in the British Cyclopædia of Agriculture, writes in similar high terms of praise. The literature on this grass, extolling its excellent qualities, is very extensive, and there is no doubt that this species deserves the attention of our farmers. The variety known as *Lolium Italicum* is regarded by many as the more desirable of the two. Analyses, made in Washington, give for *L. perenne*, ash 7.50, fat 2.64, nitrogen-free extract 56.84, crude fiber 25.42, albuminoids 7.60, and for *L. Italicum*, ash 11.02, fat 2.32, nitrogen-free extract 51.73, crude fiber 20.44, albuminoids 14.49. The first was cut "after bloom" and the last "in full bloom."

Genus AGROPYRUM, Beauvois.

Ag-ro-py'-rum.

Spikelets from three to nine-flowered or more, compressed, alternately sessile on the continuously or slightly-notched rhachis of the simple spike, and with the side against the rhachis. Glumes nearly equal and tapering to a point, or awned.

This genus includes a part of the species formerly contained in the Linnean genus *Triticum*, and under which our species will be found in the older works.

50. AGROPYRUM REPENS, Linneus.

Ag-ro-py'-rum re'-pens.

PLATE XXV.

Common Names. Witch Grass, Couch Grass, Quitch Grass, Quick Grass, Quack Grass, Wheat Grass, Twitch Grass, Dog Grass, Chandler Grass, Quake Grass, Squitch Grass.

Perennial. Stems from one to three feet high, from fibrous roots, and sending out long running root-stocks under the surface of the ground by means of which it multiplies rapidly. Spikelets from four to eight-flowered; awn shorter than the flower, or none. This variable species is common throughout the State, and flowers in July.

Much has been said and written for and against this grass, some pronouncing it one of the vilest of weeds, while others claim for it high nutritive qualities sufficient to out-weigh all the disadvantages of its growth. No one will deny that in lands where alternate husbandry is practiced, it is an evil of great magnitude, and when we have such a long list of most excellent grasses adapted respectively to every possible condition of soil in the State, from the mountains and rocky pastures down to the lowest swamp lands in our fields, it seems wholly unnecessary to cultivate this grass. An analysis of specimens of this grass cut in Maine, was made at the Department of Agriculture in Washington, and gave ash 7.28, fat 3.83, nitrogen-free extract 50.95, crude fiber 25.30, albuminoids 12.64. Specimens from other States gave quite different results, in all cases a much smaller percentage of albuminoids.

51. AGROPYRUM CANINUM, Linneus.

Ag-ro-py'-rum ca-ni'-num.

Common Names. Fibrous-Rooted Wheat Grass, Awned Wheat Grass.

Stems arising from fibrous roots but without root-stocks. Spikes more or less nodding, rather dense, from three to six inches long. Spikelets from three to five-flowered; awns fully twice the length of the flowering glume. This is apparently a rare plant in Maine.

Genus Hordeum, Linneus.

Hor'-de-um.

The ancient Latin name for barley.

Flowers arranged in a dense spike with two or three spikelets at each joint of the notched rhachis; spikelets one-flowered, with an awl-shaped rudiment of a second flower, the central spikelet of the cluster perfect and sessile, the lateral ones short-stalked and imperfect or abortive; glumes slender and bristle-form. Stamens three.

52. Hordeum jubatum, Linneus.

Hor'-de-um ju-ba'-tum.

Common Name. Squirrel-Tail Grass.

Annual. Stems erect, from four to ten inches high; perfect flowers bearing awns two inches long, about the same length as the similar glumes, all spreading.

This worthless grass is common in marshes and moist sand of the sea shore.

Genus Elymus, Linneus.

El'-y-mus.

From the Greek *elumos*, a kind of grain.

Spikelets from two to four at each joint of the rhachis of the simple stout spike, sessile, from one to six-flowered; glumes two for each spikelet, nearly side by side in its front, forming a kind of involucre for the cluster, narrow, rigid, from one to three-nerved, acuminate or awned; flowering glume herbaceous, rather shorter, oblong or lanceolate, rounded on the back, not keeled, acute or awned; palea shorter, two-keeled. Three species occur in Maine, which may be separated as follows:

1 { Flowers and glumes without awns .... *E. Mollis.*
  { Flowers and glumes, one or both, with awns..... 2

2 { Spikes, two to three inches long, upright, partly enclosed in the upper sheath..... ..... *E. Virginicus.*
  { Spikes, five to nine inches long, nodding, not enclosed in the upper sheath.....*E. Canadensis.*

53. Elymus Virginicus, Linneus.

El'-y-mus Vir-gin'-i-cus.

PLATE XXVI.

Common Names. Smooth Rye-Grass, Virginian Lyme-Grass, Wild Rye-Grass, Terrell Grass.

Perennial. Stem erect, from two to four feet high; leaves broadly linear, bright green, rough; spike rigidly erect, thick, from two to three inches long, on a short stem usually included in the sheath of the upper leaf; spikelets mostly in pairs from two to three-flowered, the flowers nearly smooth; glumes lanceolate, strongly nerved and bristle-pointed; flowering glume obscurely nerved and ending in a slender awn.

This grass is not uncommon along the moist banks of streams, and flowers in August. Flint says it is of no special value as an agricultural grass, but it is claimed in the Southern States that it is a good pasture grass.

54. Elymus Canadensis, Linneus.

El'-y-mus Can-a-den'-sis.

PLATE XXVII.

Common Names. Wild Rye, Canadian Lyme-Grass, Terrell Grass.

Perennial. Stems erect, from three to four feet high; leaves broadly linear; spikes from five to nine inches long, nodding at the top, on a long stem (peduncle.) Spikelets mostly in pairs, each of which contains from three to five long-awned, rough flowers; the awl-shaped glumes are tipped with shorter awns.

Grows along the banks of streams, and flowers in August. Not common. Probably of no greater value than *E. Virginicus.*

Specimens from the Indian Territory were analyzed in Washington, and gave ash 5.99, fat 3.71, nitrogen-free extract 50.78, crude fiber 34.66, albuminoids 4.86.

55. Elymus mollis, Trinius.

El'-y-mus mol'-lis.

Common Name. Soft Lyme-Grass.

Perennial. Stems from three to five feet high, velvety at the top; spike thick, erect, eight inches long; spikelets, two or three

at each joint, from five to eight-flowered; glumes one inch long, from five to seven-nerved, lanceolate-pointed and awnless; flowering glume and palea pointed and soft, but awnless. Grows along the shores of lakes; not common.

Genus Asprella, Willdenow.

As-prel'-la.

Spikelets two or three, sometimes solitary at each joint of the rhachis, raised on a very short pedicel, loosely two to four-flowered (when solitary, flatwise on the rhachis), in a loose terminal spike. Glumes none or small, awn-like and deciduous.

56. Asprella hystrix, Willdenow.

As-prel'-la hys'-trix.

Common Name. Bottle-Brush Grass.

Perennial. Stems erect, from two to four feet high; leaves broadly linear; spike from three to six inches long; spikelets two or three at each joint of the rhachis, at first erect, but soon spreading almost horizontally, usually three-flowered, the flowers tipped with an awn twice their length.

Moist woods. Flowers in August. This species is known in some of the older books by the name of *Gymnostichum Hystrix.*

Genus Danthonia, DeCandolle.

Dan-tho'-ni-a.

Named in honor of M. Danthoine, a French botanist.

Spikelets from three to ten-flowered, in a panicle or simple raceme, the rhachis hairy and produced beyond the flowers in a stipe or imperfect flower; glumes narrow, keeled, acute, usually as long as the spikelet; flowering glume convex on the back, of firm texture, from seven to nine-nerved, with two rigid terminal teeth or lobes, and with a flattened, twisted, and bent awn between the teeth; palea broad, two-keeled, obtuse or two-pointed.

57. Danthonia spicata, Beauvois.

Dan-tho'-ni-a spi-ca'-ta.

PLATE XXVIII.

Common Names. Wild Oat-Grass, Wire Grass, Spiked Wild Oat-Grass, White Top, Old Fog. We have heard this grass called June Grass in some parts of the State.

Perennial. Stems erect, slender, from twelve to eighteen inches high; leaves very narrow, flat or involute, more or less hairy, the lower ones numerous; spikelets few; flowering glume hairy.

This grass is common in dry open woods and fields on poor worn-out soils. Flowers in July. We have always considered this to be rather an inferior kind of grass, yet there are some farmers who hold it in high esteem! Dr. Vasey, of the Department of Agriculture, Washington, D. C., one of the highest authorities on the grasses, says it is a grass of very little value. Hon. J. S. Gould says he once had a field which, in one very dry season, bore scarcely anything but this grass. The scythes had to be ground twice a day or they would slip over the slender stems without cutting them. When it was fed to cattle in the winter, although the mangers were kept well filled, they bellowed with hunger. The horses became hide-bound, and the cows shrank in their milk. It was rather better than rye straw, but not much. Specimens from New Hampshire were analyzed in Washington, and gave ash 4.38, fat 3.80, nitrogen-free extract 56.92, crude fiber 29.11, albuminoids 5.79.

Genus Avena, Linneus.

A-vé'-na.

The ancient Latin name for oats.

Spikelets from three to many-flowered, in an open panicle, the flowers becoming of a harder texture than the large and nearly equal lanceolate, acute glumes; flowering glume with two teeth at the end and a twisted awn arising from the back.

To this genus belongs the oats (*Avena sativa*, L.) of cultivation.

58. Avena striata, Michaux.

A-ve'-na stri-a'-ta.

PLATE XXIX.

Common Names. Wild Oat-Grass, Purple Wild-Oats.

Perennial. Stems erect, simple, smooth, from one to three feet high; leaves long and smooth, the sheaths close and conspicuously striate. Spikelets from three to six-flowered, much exceeding the length of the acute, purplish glumes; lower glume one, the upper three-nerved; flowers short-bearded at the base.

Grows on rocky and shady hills. Flowers in July.

Its productiveness and agricultural value have not been tested.

Vermont specimens analyzed at the Department of Agriculture, gave ash 4.96, fat 4.00, nitrogen-free extract 56.13, crude fiber 26.16, albuminoids 8.75.

Genus Trisetum, Persoom.

Tri-se'-tum.

From the Latin, *tris*, three, and *seta*, a bristle, in allusion to the three bristles of the flower.

Spikelets two or three, rarely five-flowered, in a dense or open panicle, the rhachis usually hairy and produced into a bristle at the base of the upper flower; glumes unequal, acute, keeled, membranaceous, with scarious outer margins. Flowering glume of similar texture, keeled, acute, the apex two-toothed, the teeth sometimes prolonged into bristle-like points, the middle nerve with an awn attached above the middle, usually twisted at the base and bent at the middle; palea hyaline, narrow, two-nerved and two-toothed.

59. Trisetum subspicatum, Beauvois.

Tri-se'-tum sub-spi-ca'-tum.

PLATE XXX.

Perennial. Stems erect, about a foot high; leaves short and flat; minutely soft, downy; panicle dense, much contracted, oblong or linear, from two to three inches long; glumes about the length of the two or three flowers; awn diverging. Grows on mountains and river banks. Flowers in July. Not a common grass in Maine, but should it receive attention, it might prove a valuable grass for high pastures.

Genus Deschampsia, Beauvois.

Des-champ'-si-a.

Spikelets from two three-flowered; glumes unequal in length; flowering glume thin, membranaceous, and with an awn at the back below the middle. Panicle compound, usually spreading, the third, when present, imperfect. The species here are to be found under the genus *Aria* in the older books.

60. Deschampsia flexuosa, Linneus.

Des-champ'-si-a flex-u-o'-sa.

Common Names. Common Hair-Grass, Wood Hair-Grass.

Perennial. Stems from one to two feet high, smooth and slender; leaves mostly in a tuft from the base, very slender and with the edges rolled in from one to six inches long. The awn is longer than the flowering glume, at length becoming bent and twisted.

This species grows in dry, sandy or rocky places, and flowers in June.

Sheep are said to be fond of this grass, but as it affords only a small amount of feed, it is not worth cultivating.

61. Deschampsia cæspitosa, Linneus.

Des-champ'-si-a cæs-pi-to'sa.

PLATE XXXI.

Common Names. Hair Grass, Tufted Hair Grass.

Perennial. Stems tufted, from two to four feet high; leaves flat, linear, rough above and smooth beneath. Panicle pyramidal or oblong, six inches long; awn straight, barely equalling the flowering glume. Shores of lakes and streams. Flowers in July.

Genus Holcus, Linneus.

Hol'-cus.

Said to have been derived from the Greek, *holko*, to extract, because of its supposed virtue in drawing out thorns.

Spikelets two-flowered, crowded in an open or contracted panicle; the boat-shaped glumes nearly equal and somewhat compressed, enclosing and much exceeding the enclosed flowers, which are a

little remote from each other. The lower flower is perfect, but the upper one is staminate only and has a stout bent awn below the apex.

62. Holcus lanatus, Linneus.

Hol'-cus lan-a'-tus.

PLATE XXXII.

Common Names. Velvet Grass, Meadow Soft Grass, Velvet Mesquite Grass.

Perennial. Stems from one to three feet high, the whole plant clothed with a soft whitish down.

Found occasionally in fields with other grasses. Flowers in July. This is regarded as an undesirable grass, and should be kept out. An analysis made of it in Washington gave ash 8.23, fat 3.89, nitrogen-free extract 55.52, crude fiber 25.01, albuminoids 7.35.

Genus Hierochloa, Gruelin.

Hi-e-rock'-lo-a.

From the Greek, *hieros*, sacred, and *chloa*, grass, because it is used in certain religious festivals in Germany.

Spikelets three-flowered, the two lower flowers staminate, and having three stamens, mostly awned; the upper flower perfect but having only two stamens, and without awns. Smooth perennial grasses having the odor of vanilla.

63. Hierochloa borealis, R. and S.

Hi-e-rock'-lo-a bo-re-a'-lis.

PLATE XXXIII.

Common Names. Vanilla Grass, Seneca Grass, Holy Grass.

Stems simple, erect, from twelve to eighteen inches high; leaves smooth and shining, the lower ones very long, while those of the stem are short. Panicle somewhat one-sided, pyramidal, from two to five inches long; peduncles smooth; perfect flower pointless, staminate flowers slightly awned, spikelets chestnut colored. Grows in wet lands, and flowers in June.

This grass is remarkably sweet-scented and is used by the Penobscot Indians, in the manufacture of baskets, but does not appear to be of any value as a fodder.

Specimens from Illinois gave ash 9.32, fat 4.06, nitrogen-free extract 49.45, crude fiber 23.02, albuminoids 14.15.

64. Hierochloa alpina, R. and S.

Hi-e-roch'-lo-a al-pi'-na.

Common Name. Alpine Holy Grass.

Stems erect, from six to twelve inches high; stem-leaves short. Panicle contracted, from one to two inches long; spikelets oblong, compressed, longer than the pedicels.

This species grows on the summits of mountains and flowers in July.

Genus Anthoxanthum, Linneus.

An-thox-an'-thum.

From the Greek, *anthos*, a flower, and *xanthos*, yellow.

Panicle somewhat spiked; spikelets three-flowered, the two lower ones represented only by a single-awned flowering glume each, which are hairy on the outside and notched at the end, from the bottom of which the awns arise. The upper glume is fully as long as the flowers, somewhat hairy and twice the length of the lower glume. Stamens three.

65. Anthoxanthum odoratum, Linneus.

An-thox-an'-thum o-do-ra'-tum.

PLATE XXXIV.

Common Names. Sweet Vernal Grass, Sweet-Scented Vernal Grass.

Perennial. Stems erect, slender, from twelve to eighteen inches high; leaves more or less pubescent; ligule elongated. Panicle usually contracted into more or less of a spike which is of a brownish color or tinged with green; flowers pubescent, shorter than the awns.

Common in fields and pastures; flowers in June and July.

This grass is very sweet-scented in drying. It is nowhere considered a valuable grass, for the yield is very light. It is much used to mix with other species on lawns. Specimens of this grass from New Hampshire were analyzed in Washington, and gave ash 8.43, fat 3.41, nitrogen-free extract 53.81, crude fiber 25.79, albuminoids 8.56.

Genus PHALARIS, Linneus.

Phal'-a-ris.

From the Greek, *phalos*, shining, in allusion to the smooth surface of the flowering glume. Spikelets crowded in a clustered or spiked panicle, apparently one, but really three-flowered, the two inferior flowers scale-like and minute, the upper flower perfect. Glumes equal, keeled and awnless.

66. PHALARIS CANARIENSIS, Linneus.

Phal'-a-ris ca-na-ri-en'-sis.

Common Name. Canary Grass.

Annual. Stems simple and smooth, from eighteen inches to two feet high; leaves one-third of an inch wide, pale green, the sheaths somewhat inflated. Panicle spike-like, oval; glumes boat-shaped, entire at the point, yellowish green; flowering glume and palea hairy.

Grows about houses where the seeds have been scattered. Flowers from July to September. Cultivated occasionally for the seed, which is considered the best food for Canary birds. Hon. J. S. Gould says that cattle are very fond of it when it is young, but the yield is too small to be profitable.

67. PHALARIS ARUNDINACEA, Linneus.

Phal'-a-ris a-run-di-na'-ce-a.

PLATE XXXV.

Common Names. Reed Canary-Grass, Ribbon Grass.

Perennial. Stems erect and smooth, from two to four feet high; leaves one-third of an inch wide, smooth, with rough edges. Panicle from two to five inches long, ovoid, a little spreading when old; glumes boat-shaped, obtusely keeled. Wet grounds. Flowers in July.

In variety *picta*, the leaves are striped with white. This is the common Ribbon-Grass of the gardens, which, if planted in low or wet grounds will change to the original grass again.

This grass is said to be extensively used in Sweden for fodder, but in this country cattle will not eat it if they can get anything

better. An analysis of this grass, "in bud," was made by Prof. F. H. Storer, and gave ash 6.63, fat 2.99, nitrogen-free extract 42.93, crude fiber 36.39, albuminoids 11.06.

Genus Panicum, Linneus.

Pan'-i-cum.

Said to be derived from the Latin, *panis*, bread; the grain of some species being used for food.

The flowers are arranged in panicles in some species and in spikes in others. Spikelets two-flowered, naked, the flowers with or without awns; the lower one staminate or neutral, the upper one perfect.

Nine species of this genus have been reported in this State thus far, and these may be distinguished by the following table:

1 { Flowers with awns..... *P. crus-galli.*
  { Flowers without awns..... 2

2 { Spikelets crowded on one-sided spikes..... *P. glabrum.*
  { Spikelets scattered in panicles 3

3 { Panicle elongated, wand-like or pyramidal..... 4
  { Panicle short or small, loosely spreading..... 5

4 { Sheaths, and usually the leaves, very hairy .... *P. capillare.*
  { Sheaths and leaves not hairy..... *P. virgatum.*

5 { Leaves wide, with from nine to fifteen nerves..... 6
  { Leaves narrow, with few or indistinct veins 8

6 { Outside of the sheaths smooth ..... *P. latifolium.*
  { Outside of the sheaths rough with minute bristles..... 7

7 { Base of the leaves heart-shaped and clasping; about an inch wide..... *P. clandestinum.*
  { Base of the leaves not heart-shaped and clasping; about half an inch wide..... *P. xanthophysum.*

8 { Stems short and tufted ..... *P. depauperatum.*
  { Stems taller and nearly simple ..... *P. dichotichum.*

68. Panicum glabrum, Gaud.

Pan'-i-cum gla'-brum.

Common Name Smooth Crab-Grass.

Annual. Stems from five to twelve inches long, spreading, prostrate or sometimes erect. Spikes three or four in number, spread-

ing, from two to six inches long, diverging, nearly digitate. Spikelets ovoid; lower glume wanting, the upper one equalling the flower. A troublesome weed. Grows in waste and cultivated grounds, and flowers from August to October.

69. PANICUM CAPILLARE, Linneus.

Pan'-i-cum cap-il-la'-re.

PLATE XXXVI.

Common Names. Old-Witch Grass, Hair-Stalked Panic-Grass.

Annual. Stems from one to two feet high, often branching at the base and forming a tuft; leaves flat, one-third of an inch wide and hairy; the sheaths clothed with rigid, spreading hairs. Panicle in the form of a pyramid, expanding, loose; glumes often purplish.

Sandy soils and cultivated fields. Flowers in August and September.

This is one of the most worthless of grasses, and is generally rejected by cattle. Specimens from the Indian Territory were analyzed at the Department of Agriculture, and gave ash 5.59, fat 3.89, nitrogen-free extract 55.30, crude fiber 28.24, albuminoids 6.98.

70. PANICUM VIRGATUM, Linneus.

Pan'-i-cum vir-ga'-tum.

PLATE XXXVII.

Common Names. Tall Panic-Grass, Tall Smooth Panic-Grass, Switch Grass.

Perennial. Stems from three to five feet high; leaves very long and flat, of a yellowish tinge when old; ligule silky bearded; whole plant very smooth; panicle diffuse, very large; spikelets scattered, usually purplish, the lower flowers staminate, with the flowering glume and palea nearly equal.

Moist, sandy soil, flowering in August. Dr. Vasey says this is a good and prolific grass if cut when young; when ripe it becomes harsh and unpalatable. Texas specimens gave ash 7.24, fat 1.66, nitrogen-free extract 49.39, crude fiber 36.78, albuminoids 4.93.

71. Panicum latifolium, Linneus.

Pan'-i-cum lat-i-fo'-li-um.

Common Name. Broad-Leaved Panic-Grass.

Perennial. Stems erect, smooth, simple or somewhat branching, from one to two feet high. The joints and throat of the sheaths bearded with soft, woolly hairs; leaves, often one inch wide, broadly oblong-lanceolate from a heart-shaped, clasping base. Panicle terminal, partially enclosed by the sheath of the upper leaf; spikelets obovate and downy.

Grows in moist woods, and flowers in July and August. Flint says it is of no value for cultivation.

72. Panicum clandestinum, Linneus.

Pan'-i-cum clan-des-ti'-num.

Common Name. Hidden-Flowered Panic-Grass.

Perennial. Stems from one to three feet high, erect, rigid, very leafy to the top; leaves from three to six inches long and an inch or more wide; strongly nerved, smooth or slightly hairy above, with a heart-shaped, clasping base; joints naked, with papillæ bearing very stiff and spreading bristly hairs; lateral and also terminal panicle more or less enclosed in the sheaths; spikelets ovoid, often smooth; lower flowers neutral.

Grows in low thickets and on river banks. Flowers in July and August.

73. Panicum xanthophysum, Gray.

Pan'-i-cum xan-tho-phy'-sum.

Common Name. Yellow Panic-Grass.

Perennial. Whole plant light green, becoming yellowish in drying; stems from twelve to fifteen inches high, slender and smooth; leaves from three to six inches long and about half an inch wide; sheaths hairy. Panicle nearly simple, few-flowered, on a long, naked, slender peduncle; spikelets globose-obovate, pubescent, the lower glume about one-third the length of the upper one; lower flower staminate.

Grows on dry, sandy soils, and flowers in June. Rare.

74. Panicum dichotomum, Linneus.

Pan'-i-cum di-chot'-o-mum.

Common Name. Polymorphus Panic-Grass.

Perennial. Stems from eight inches to two feet high, at first simple, mostly erect, but sometimes procumbent. Radical leaves short and very broad, often purplish and usually smooth, those of the stem narrower and much longer, spreading, smooth or hairy; sheaths pubescent or sometimes smooth. Spikelets minute, on long peduncles, obovate, mostly pubescent, lower glume one-third the length of the upper; lower flower neutral. This is an extremely variable species.

Moist meadows, fields and woods. Flowers from July to September.

75. Panicum depauperatum, Muhlenberg.

Pan'-i-cum de-pau-per-a'-tum.

Common Names. Worthless Panic, Few-Flowered Panic-Grass.

Perennial. Stems from eight to fifteen inches high; lowest leaves short and near together, upper ones from three to six inches long, pale green, more or less hairy underneath, smooth above, fringed with a few long hairs towards the base, involute when old; sheaths about two inches long, on a slender peduncle, the branches mostly clothed more or less with rather stiff, spreading hairs. Panicle in pairs; spikelets somewhat acuminate when dry, conspicuously striate.

Dry woods and highlands. Flowers in June.

76. Panicum crusgalli, Linneus.

Pan'-i-cum crus-gal'-li.

PLATE XXXVIII.

Common Names. Barnyard Grass, Barn Grass.

Annual. Stem from two to four feet high, stout, erect or somewhat procumbent; leaves half an inch or more in breadth. Panicle dense pyramidal, the spikelets crowded in dense, spike-like racemes; glumes acute, the awn variable in length and sometimes wanting; flowering glume of the neutral flower usually awned; perfect flowers smooth and coriaceous.

Very common everywhere in moist, rich lands. Flowers in August and September.

This grass is regarded as a mere weed in this State, but in the South it is cultivated to some extent for fodder. Specimens from Pennsylvania were analyzed in Washington, and gave ash 11.82, fat 2.49, nitrogen-free extract 47.77, crude fiber 25.32, albuminoids 12.60.

Genus SETARIA, Beauvois.

Se-ta'-ri-a.

From the Latin *seta*, a bristle, in allusion to the bristly spikes.

Spikelets in a cylindrical spike-like, or sometimes interrupted panicle. Below the spikelets there are several bristles, which remain after the spikelets fall off. The spikelets contain two flowers (apparently only one), the upper one perfect, the lower one male or sterile; glumes nearly equal in length, much shorter than the flowers. Three species occur in Maine, and may be separated as follows:

1 { Spike (or panicle) nodding from four to six inches long, *S. Italica.*
{ Spike erect, from two to three inches long 2

2 { Spike tawny yellow ..... *S. glauca.*
{ Spike green ..... *S. viridis.*

77. SETARIA GLAUCA, Beauvois.

Se-ta'-ri-a glau'-ca.

PLATE XXXIX.

Common Names. Foxtail, Bottle Grass, Pigeon Grass.

Annual. Stems erect, from one to three feet high; leaves hairy at the base; sheaths smooth; ligule bearded. Spike cylindrical, simple, tawny, from two to three inches long; from six to ten bristles arise from the base of each spikelet, two or three times as long as the spikelets, which are rough upwards and of a tawny or dull orange yellow color when old. Fields and cultivated grounds. Flowers in August.

This grass has been regarded as a worthless weed, but Dr. Warder stated that he had a luxuriant growth of it in one of his corn fields; that he mowed it and made it into hay. To his great surprise, he found that in the winter season his cattle ate it voraciously; they

would leave Blue Grass and Timothy at any time to eat it. The seeds are said to be excellent for turkeys and chickens. Dr. Vasey says this grass is as nutritious as Hungarian Grass, but not as productive. An analysis of this grass made at the Department of Agriculture gave ash 7.27, fat 2.66, nitrogen-free extract, 55.28, crude fiber 25.75, albuminoids 9.04.

78. Setaria viridis, Beauvois.

Se-ta'-ri-a vir'-i-dis.

Common Names. Green Foxtail, Bottle Grass.

Annual. Stems from two to three feet high, erect, mostly simple; spike cylindrical, green, from two to three inches long; bristles from four to ten arising from the base of each spikelet. Cultivated fields. Flowers in August. The seeds are eaten by poultry and birds.

79. Setaria Italica, Kunth.

Se-ta'-ri-a I-tal'-i-ca.

PLATE XL.

Common Names. Hungarian Grass, Italian Millet, German Millet.

Annual. Stems erect, stout, from two to four feet high, with numerous long and broad leaves and a terminal, spike-like, nodding panicle, from four to six inches long and often an inch or more in diameter. The panicle is composed of a great number of small, closely crowded branches, each of which consists of a small group of several clusters of spikelets at the base of which arise two or three bristles, sometimes long and sometimes short. This variable species has been considered, until recently, to comprise more than one species, but botanists now regard the different forms as only varieties of one species. It owes its value as a fodder plant to the abundance of its foliage and to the large amount of seed produced. Prof. Phares states that for forage it should be cut as soon as it blooms, when, of course, it is worth nothing for seed, but is most valuable for forage and exhausts the land much less. If left for the seed to mature they are very abundant and rich feed, but the stems are worthless, while the soil is more damaged. Specimens

from Pennsylvania were analyzed at Washington, and gave ash 7.50, fat 2.71, nitrogen-free extract 55.78, crude fiber 24.52, albuminoids 9.45.

Genus ANDROPOGON, Linneus.

An-dro-po'-gon.

From the Greek, *aner*, man, and *pogon*, a beard, in allusion to the hairy flowers.

Spikelets arranged in simple or panicled spikes. Spikelets in pairs in the alternate notches of the rhachis, one sessile and perfect, the other pediceled and staminate or neuter. Fertile spikelet with two more or less coriaceous glumes and with the palea awned at the tip.

Spikes two to five from one point (digitate).....*A. furcatus.*
Spikes distinct, not from one point.....*A. scoparius.*

80. ANDROPOGON FURCATUS, Muhlenberg.

An-dro-po'-go fur-ca'-tus.

PLATE XLI.

Common Names. Blue Stem, Finger-Spiked Wood-Grass.

Perennial. Stems erect, from three to four feet high, the naked top of the stem terminated by from two to five rigid spikes. Spikelets approximate, appressed; hairs at the base of the fertile spikelet, on the rhachis and on the stout pedicel of the awnless staminate spikelet, short and rather sparse; awn of the fertile flower long and bent.

Grows in dry, sterile soils, and flowers in August and September.

This species has not been cultivated in this State, but Dr. Vasey states that it is abundant on the prairies of the West, where it is one of the principal hay grasses of the country, and is extensively cut and cured for winter use. An analysis of specimens from Pennsylvania, gave ash 13.53, fat 2.47, nitrogen-free extract 51.97, crude fiber 27.04, albuminoids 4.99.

81. Andropogon scoparius, Michaux.

An-dro-po'-gon sco-pa'-ri-us.

PLATE XLII.

Common Names. Wood Grass, Purple Wood Grass, Broom Grass.

Perennial. Stems from three to four feet high, with numerous paniculate branches; lower sheaths and narrow leaves hairy. Spikes slender, scattered, mostly pendunculate, from one to two inches long, very loose, often purplish, sickly, with dull whitish hairs. Sterile spikelet awn-pointed or awnless, the fertile flower about half the length of its twisted or bent awn.

Grows in dry, barren soils, and flowers in August.

In some parts of the South it is very common and much despised, though it has its good qualities, for in the dry pine woods it contributes, while green and tender, a large share to the sustenance of stock.

One analysis made in Washington, of specimens from Alabama, gave ash 5.84, fat 1.58, nitrogen-free extract, 62.29, crude fiber 24.64, albuminoids 5.65.

OFFICERS,

Financial Statement and Statistics

OF

AGRICULTURAL SOCIETIES.

OFFICERS OF AGRICULTURAL SOCIETIES.

SOCIETIES	President.	Post Office.	Secretary.	Post Office	Treasurer.	Post Office.
State Agricultural Society	Rufus Prince	South Turner	A. L. Dennison	Portland	H. S. Osgood	Augusta.
Eastern Me. Fair Association,	J. P. Bass	Bangor	Ezra L. Stevens	Bangor	E B. Nealley	Bangor.
Maine State Pomological So.	C. S. Pope	Manchester	Geo B. Sawyer	Wiscasset	Geo. B. Sawyer	Wiscasset.
Androscoggin	B. F. Briggs	Auburn	W. R. Wright	Lewiston	David Farrar	Lewiston.
Aroostook	J. R. Slipp	Houlton	Ira J. Porter	Houlton	J. Frank Holland	Houlton.
Aroostook, North	Edward Wiggin	Maysville Centre.	Henry H. Cook	Presque Isle	Columbus Hayford	Maysville Centre.
Aroostook, Madawaska	Lue Albert	Upper Madaw'ska	Alexis Cyr	Grand Isle	Jean Cyr	Upper Madaws'ka
Cumberland County	W. W. Harris	Cumberland Cent.				
Franklin County	Silas Wilder	Temple	H. B. Coolidge	Farmington	P. P. Tufts	Farmington.
Franklin, North	T. B. Hunter	Phillips	M. S. Kelley	Phillips	M. C. Kelley	Phillips.
Franklin, Central	A. C. True	Strong	E. J. Gilkey	Strong	M. A. Will	Strong.
Knox County	Erastus Lermond	Thomaston	E. G. S. Ingraham	West Camden	Jesse A. Tolman	Rockland.
Knox, North	C. R. Morton	Union	A. M. Wingate	Union	N. R. Burkett	Union.
Kennebec County	J. R. Yeaton	Mt. Vernon	H. P. Nickerson	Readfield	C. H. Stevens	Readfield.
Kennebec, North	S. J. Abbott	Waterville	A. H. Rice	Waterville	J. G. Soule	Waterville.
Lincoln County	Geo. B. Sawyer	Wiscasset	Rufus C. Reed	Damariscotta	Ephraim Taylor	Newcastle.
Oxford County	Seth T. Holbrook	Oxford	A. C. T. Ring	South Paris	A. C. T. Ring	South Paris.
Oxford, West	A. O. Pike	Fryeburg	D L Lamson	Fryeburg	John Locke	Fryeburg.
Penobscot County	J. E. Shaw	West Hampden	B. A. Burr	Bangor	B. A. Burr	Bangor.
Penobscot and Aroostook	James Ambrose	Coral	L B. Rogers	Patten	E. W. Perry	Kenduskeag.
Penobscot, West	S. W. L. Chase	Exeter Mills	T. P. Batchelder	Kenduskeag	T. P. Batchelder	Kenduskeag.
Penobscot, North	Francis Crane	Lincoln	R. W. Bailey	Lincoln	Joseph Burland	Lincoln.
Penobscot, Central	Geo. W. Dunning	West Charleston	Geo H. Smith	East Corinth	James Knowles	East Corinth.
Piscataquis, East	H. F. Daggett	Milo	M. L. Durgin, Jr	Milo	M. L. Durgin, Jr	Milo.
Piscataquis, Central	Obed Towne	East Dover	B F. Hammond	Foxcroft	B. F. Hammond	Foxcroft.
Piscataquis, West	N. C. Strout	Monson	J. F. Thombs	Monson	J. F. Thombs	Monson.
Sagadahoc	Franklin Reed	Bath	I. E. Mallett	Topsham	Lyman E. Smith	Brunswick.
Somerset, East	C. M. Jewett	Palmyra	John Finson	Hartland	G. M. Burleigh	Hartland.
Somerset, Central	R. B. Shepherd	Skowhegan	A. R. Smiley	Skowhegan	A. R. Bixby	Skowhegan.
Somerset, West	S. W. Tinkham	Anson	Benj. F. Moore	North Anson	Benj. F. Moore	North Anson.
Waldo County	Simon A. Payson	Belfast	Mark A. Wadlin	Belfast	Alvah S. Redman	Belfast.

Waldo and Penobscot	Freeman Atwood	Monroe	E. H. Nealley	Monroe	T. L Palmer	Monroe.
Waldo, North	James B. Vickery	Unity	James H. Cook	Unity	H. B. Rice	Unity.
Washington County	Enoch Fisher	Charlotte	H. F. Porter	Pembroke	Peter E. Vose	Denneysville.
Washington, Machias P'k As'n	John R. Ames	Machias	W. H. Phinney	Machias	L. H. Crane	Machias
Washington, West	Geo. B Drisko	Columbia	Eben F. Allen	Columbia Falls	Frank L. Allen	Columbia Falls.
York County	Daniel A. Burnham	Biddeford	D. O. S. Hooper	Biddeford	George H. Boothby	Saco.
York, Buxton and Hollis	J. M. Harper	East Waterboro'	Geo. W. Milliken	Hollis	Colvie Roberts	South Hollis.
York, Acton and Shapleigh	J. D. Sanborn	Acton	Horace Bedwell	Acton	H. A. Stanley	Shapleigh.
York, Ossipee Valley Assoc'n,	Benj. F. Pease	Cornish	James C. Ayer	Cornish	Howard Brackett	Cornish.

FINANCIAL STATEMENT OF AGRICULTURAL SOCIETIES FOR THE YEAR 1884.

	Amount Received from State.	Amount Raised by Society.	Total Receipts for the Year.	Total Amount of Premiums and Gratuities Awarded.	Incidental Expenses for the Year.	Whole Amount of Disbursements for the Year	Value of Property Belonging to the Society.	Amount of Liabilities of the Society.	Awards for Plowing at Exhibition.	For Bulls and Bull Calves.	For Working Oxen, 4 years old and over.	For Steers under 4 years old.	For Milk Cows.	For Heifers and Heifer Calves.
Maine State Pomological Society..	$500 00	$494 20	$994 20	$641 00	$334 31	$501 31	$200 00	$800 00						
Androscoggin	400 00	400 00	-	400 00	75 00	475 09	900 00							
Aroostook	-	104 00	104 00	93 30	10 15	103 45	-	60 00	-	$6 50	$3 00	$4 00	$7 00	$3 00
Aroostook, North	97 00	71 50	168 50	155 90	74 38	230 28	-	-	-	10 25	7 00	18 00	21 00	11 00
Aroostook, Madawaska	60 00	47 00	107 00	66 10	15 00	81 10	-	-	-	3 00	3 00	6 50	2 25	3 75
Cumberland County														
Franklin County	107 00	2,229 81	2,626 76	645 50	75 00	2,224 60	3,000 00	950 00	-	25 00	63 00	71 50	25 50	15 00
Franklin, North	55 00	1,117 65	1,221 96	290 00	155 00	1,164 65	1,000 00	690 00	$4 50	7 00	38 00	27 50	10 75	8 75
Franklin, Central	20 00	147 89	167 89	78 00	20 50	155 71	700 00	400 00	-	3 50	7 75	8 25	90	1 00
Knox County	177 00	512 87	689 87	386 25	299 30	695 05	35 00	-	-	18 00	10 00	5 50	21 50	14 50
Knox, North	151 00	525 21	676 21	261 70	368 56	630 26	-	-	-	7 50	40 00	9 75	4 50	6 75
Kennebec County	297 00	1,122 57	1,419 57	691 00	547 47	1,123 22	900 00	207 25	-	16 00	20 00	15 50	32 00	23 75
Kennebec, North	103 09	315 00	418 09	424 00	105 00	330 02	2,000 00	164 00		17 00	10 00	15 00	14 00	8 00
Lincoln County	248 00	573 30	821 30	395 36	536 58	931 94	-	-	-	8 75	6 00	11 00	5 00	3 50
Oxford County	214 00	2,883 03	3,097 03	1,567 65	1,217 70	3,018 75	7,500 00	1,607 75	15 00	78 00	93 00	73 00	61 00	48 00
Oxford, West	64 00	862 00	926 00	571 55	150 00	721 55	2,000 00	-	-	8 00	40 00	35 00	13 00	4 00
Penobscot County	71 00	88 96	159 96	140 00	75 00	210 00	-	-	-	4 50	-	4 00	13 00	1 50
Penobscot and Aroostook	100 00	83 47	-	109 50	27 44	136 91	-	-	-	2 00	8 50	9 50	9 00	1 50
Penobscot, West	213 00	530 74	743 74	327 45	225 00	562 45	3,000 00	-	-	14 50	17 00	21 00	12 50	13 75
Penobscot, North	34 00	126 00	160 00	109 99	25 00	180 00	-	35 00	-	4 00	6 00	9 25	6 00	9 75
Penobscot, Central	69 00	73 00	142 12	181 10	23 29	142 12	-	-	-	12 00	29 00	9 75	23 25	5 50
Piscataquis, East	20 00	38 00	58 00	60 00	21 85	60 00	-	-	-	1 00	3 50	8 25	1 50	2 25
Piscataquis, Central	113 00	437 00	550 35	336 25	166 00	502 25	-	-	-	10 00	35 00	10 00	18 00	6 00

Piscataquis, West															
Sagadahoc	203 00	2,414 17	2,677 17	867 25	1,390 00	2,863 25	5,500 00	2,000 00	–	29 50	114 00	45 50	46 00	37 00	
Somerset, East															
Somerset, Central	181 00	832 10	1,013 10	822 75	440 35	1,263 10	2,000 00	250 00	–	48 00	59 00	47 00	33 00	44 00	
Somerset, West															
Waldo County	133 00	584 75	717 75	677 50	47 50	725 00	2,500 00	7 25	6 00	36 00	9 00	21 00	56 00	26 00	
Waldo and Penobscot	130 00	1,308 45	1,438 45	885 52	–	–	2,500 00	–	–	23 50	36 00	31 00	24 00	14 50	
Waldo, North	90 00	414 50	504 50	415 75	99 40	515 15	–	–	–	23 50	40 00	14 75	12 00	14 25	
Washington County	215 00	1,021 66	1,236 66	883 00	391 26	1,321 21	1,6[illegible]0 00	–	–	94 00	12 00	26 50	29 50	36 50	
Washington, Machias Park Ass'n	–	810 00	–	416 60	434 30	850 30	2,500 00	39 60	–	36 00	22 00	26 00	25 00	16 00	
Washington, West	185 00	–	1,605 11	1,019 71	576 41	1,596 12	150 00	–	–	22 50	19 00	26 00	23 00	25 50	
York County	185 00	1,225 00	1,410 40	807 20	448 67	1,206 37	–	212 28	8 00	15 50	48 00	16 00	21 00	11 00	
York, Buxton and Hollis	40 60	–	700 00	243 45	500 00	900 00	1,000 00	450 00	–	6 00	35 00	6 00	10 00	3 00	
York, Shapleigh and Acton	44 00	399 28	443 27	301 75	20 00	321 75	5,000 00	–	–	10 25	48 00	12 75	8 00	5 50	
York, Ossipee Valley Association	200 00	996 15	1,196 15	696 10	286 38	1,032 48	3,200 00	41 55	–	22 00	55 00	26 00	39 00	26 00	

FINANCIAL STATEMENT OF AGRICULTURAL SOCIETIES FOR THE YEAR 1884—*Continued.*

	For Fat Cattle.	For Trials of Speed.	For Stallions.	For Breeding Mares.	For Other Horses and Colts.	For Swine.	For Sheep	For Poultry.	Total Amount Awarded for Live Stock.	Total Amount Awarded for Horses, not purses.	Amount Awarded for Indian Corn.	For Wheat.	For Rye.	For Barley.	For Oats.	For Buckwheat.	For Beans.	Peas	For Potatoes.	For Carrots.
Maine State Pomolog'l Society																				
Androscoggin			$																	
Aroostook	–	–	10 00	5 00	22 50	5 00	6 00	2 00	36 50	37 50	–	1 50	–	1 00	1 50	–	–	1 00	1 00	10
Aroostook, North	–	–	6 00	12 00	36 00	–	3 00	2 00	72 25	54 00	–	1 50	–	–	75	–	1 50	–	1 50	
Aroostook, Madawaska	–	$3 00	4 75	3 00	13 00	–	4 50	–	23 00	20 75	50	75	–	50	75	–	75	75	75	75
Cumberland County																				
Franklin County	$8 50	232 00	13 50	3 75	15 50	8 00	42 10	4 95	270 55	32 75	70	3 00	–	1 00	1 50	–	20	–	55	20
Franklin, North	5 90	90 00	4 00	4 50	10 00	–	11 50	12 25	121 55	21 50	3 00	7 00	–	–	5 00	–	1 00	–	1 45	
Franklin, Central	1 25	–	1 50	1 75	4 95	2 75	5 25	60	22 65	16 80	65	2 00	–	–	2 50	–	–	–	1 00	
Knox County	5 00	–	15 00	3 00	50 00	17 00	9 00	17 75	126 25	83 00	6 50	5 00	–	–	2 00	–	6 25	50	8 00	
Knox, North	3 00	–	11 00	3 00	15 50	6 00	8 00	2 50	88 00	29 50	5 50	3 00	–	–	1 50	–	–	50	1 75	50
Kennebec County	8 50	162 00	16 00	6 00	39 00	10 00	25 00	10 50	161 25	71 00	16 00	–	–	3 00	–	–	3 00	–	6 00	
Kennebec, North	5 00	190 00	18 00	6 00	10 00	4 00	9 00	6 00	124 00	34 00	1 00	–	–	–	–	–	–	–	1 00	
Lincoln County	5 00	120 00	16 00	5 00	30 00	3 00	3 50	3 25	49 00	51 00	12 25	7 50	–	–	–	–	1 25	1 00	2 25	1 50
Oxford County	20 00	575 00	52 00	10 00	17 00	14 00	46 00	4 50	437 50	114 00	28 00	26 75	–	4 00	6 00	–	3 00	–	10 75	75
Oxford, West	9 00	100 00	–	3 00	17 00	11 00	13 00	2 00	133 00	20 00	17 75	9 25	2 00	–	3 00	–	3 00	2 00	4 50	75
Penobscot County	–	–	–	–	14 00	3 00	5 50	10 00	–	–	3 75	3 50	1 50	1 50	1 50	–	3 00	1 50	1 75	75
Penobscot and Aroostook	–	3 00	–	3 50	10 25	6 00	11 00	1 00	52 00	13 75	50	2 50	–	–	50	–	–	–	50	50
Penobscot, West	3 00	–	11 00	6 00	33 00	3 00	10 00	6 00	100 75	50 00	27 45	8 00	–	1 75	2 25	1 00	2 25	1 00	1 80	
Penobscot, North	–	3 00	–	3 00	11 50	–	1 50	2 00	38 50	17 50	1 00	–	–	–	–	–	–	–	25	25
Penobscot, Central	–	–	5 00	5 50	24 50	–	2 50	1 75	96 75	35 10	3 25	–	–	–	–	–	1 00	–	3 00	
Piscataquis, East	3 50	5 00	2 00	3 00	6 75	1 50	4 50	1 50	20 00	11 75	75	–	–	–	–	–	75	75	75	
Piscataquis, Central	–	133 00	10 00	28 50	19 00	11 00	9 00	6 00	105 00	57 00	–	–	–	–	–	–	–	–	25	25

Piscataquis, West																															
Sagadahoc	12	00		–	13	00	12	00	53	00	11	00	30	00	62	80	388	00	78	00	14	00	1	00	1	50	7	75	9	75	2	50	4	75	1	70	8	50		75
Somerset, East																															
Somerset, Central	14	00	200	00	21	00	9	00	61	00	11	00	9	00	13	00	278	00	91	00	3	00		75		75		75	1	25	–		1	25		75	3	00		50
Somerset, West																															
Waldo County	12	00	400	00	17	00	4	50	25	00	7	50	11	00	–		178	50	46	50																				
Waldo and Penobscot	10	00	430	00	34	00	7	00	48	0	8	00	12	00	21	00	180	00	89	00	9	50	4	00	–		1	50	1	50	–		–		1	50	4	00	1	50
Waldo, North	7	00	168	00	23	00	6	00	45	75	–		13	75	3	0	111	50	51	75	6	00	6	00	1	50	2	00	1	00	–		3	50	–		6	00	1	25
Washington County	6	00	276	00	10	00	24	00	45	00	17	00	24	00	17	50	303	00	79	00	1	50	7	00		25	1	00	4	00	2	25	5	50	1	50	27	00	3	75
Washington, Machias P'k As'n		–	300	00		–	18	00	29	00	18	00	26	0	23	50	192	50	47	00	2	75	3	00		–	1	50	1	50	–		2	25	1	00	7	50	1	75
Washington, West		–	527	50		–	11	00	32	00	13	00	21	00	24	50	174	00	43	00	2	75	11	00		–	5	00	5	00	–		5	25	5	25	6	50	3	75
York County	6	00	371	00	7	00	6	00	25	00	7	00	8	00	24	00	156	50	38	00	1	50	5	00	1	00	1	00	–		–		–		–		2	50		
York, Buxton and Hollis	2	00	113	70	5	00	2	00	11	00	1	00	3	00	1	50	66	00	18	00	3	00	–		–		–		–		–		1	50		50		75		
York, Shapleigh and Acton	6	00	100	00	3	00	3	50	130	00	10	00	8	00	3	00	113	50	33	00	5	00	2	50	2	50	2	50	2	50	–		7	50	1	50	1	50	1	50
York, Ossipee Valley Ass'n	3	00	310	00	14	00	7	00	66	00	6	00	22	00	5	00	204	00	87	00	6	00	–		–		–		2	00	–		–		–		3	00		

FINANCIAL STATEMENT OF AGRICULTURAL SOCIETIES FOR THE YEAR 1884—*Concluded.*

	For Beets	For Onions.	For Turnips.	For Cabbage.	Total am't awarded for Grain and Root Crops.	For any Other Cultivated Crops.	For Fruits and Flowers.	For Honey, Sugar and Syrup.	For Bread, Butter and Cheese.	Agricultural Implements.	Household Manufactures and Needle-Work	Manufactures of Wood, Iron and Leather.	Other Mechanical Products.	All Objects not Enumerated Above.	Number of Bulls and Bull Calves.	Number of Cows.	Number of Heifers.	Number Heifer Calves.	Number Working Oxen (pairs.)	Number Pairs Steers.	Number Fat Cattle.	Total Number of Cattle.	Number Horses, Colts.	Number Sheep.	Number Swine.	Number Poultry.
Maine State Pomo. Soc'ty	–	–	–	–	–	–	$641 00	–	–	–	–	–	–	–												
Androscoggin	–	–	–	–	–	–	–	–	–	–	8 40	2 25	–	–	12	8	9	5	8	6	–	62	39	6	24	
Aroostook	10	35	50	–	7 05	60	75	25	–	–	3 15	–	–	2 00	5	12	6	5	3	4	–	35	42	13	19	10
Aroostook, North	–	75	–	–	7 00	–	9 25	1 00	8 25	–	9 35	–	–	75	8	6	10	6	5	10		60	41	16		
Aroostook, Madawaska	45	90	45	45	7 75	–	–	75	75	–																
Cumberland County																										
Franklin County	90	35	50	35	9 25	6 45	19 70	3 10	9 25	1 75	25 30	4 65	17 50	14 40	24	25	25	6	6	70	6	155	99	107	7	39
Franklin, North	45	45	45	45	–	1 25	3 90	2 40	3 75	50	26 00	–	–	–	12	17	13	–	39	48	9	225	39	63		75
Franklin, Central	–	–	45	–	7 45	1 65	4 65	1 05	1 85	–	14 45	–	80	1 50	6	7	3	2	12	10	4	44	13	42	3	12
Knox County	1 50	4 50	1 00	3 50	37 75	16 50	1 25	8 50	23 00	–	30 00	–	–	53 75	8	20	15	6	8	5	5	67	15	18	24	81
Knox, North	1 50	1 50	75	1 50	18 60	2 95	27 25	–	15 50	50	38 85	2 00	–	39 15	5	5	6	3	21	9	2	51	27	5	10	9
Kennebec County	5 00	–	5 00	–	38 00	–	40 50	2 75	39 00	8 00	52 50	–	–	–	25	69	54	65	147	84	12	699	51	77	85	130
Kennebec, North	–	–	–	–	–	–	31 00	–	12 00	–	10 00	2 00	–	–	8	12	6	8	7	16	7	64	43	34	10	
Lincoln County	1 00	1 00	50	–	28 25	7 00	30 05	7 75	4 25	2 00	15 50	–	–	67 31	5	9	14	4	14	14	10	108	37	14	10	61
Oxford County	3 00	75	75	–	84 50	–	44 75	9 00	33 00	22 50	46 70	53 50	8 35	13 95	24	28	26	9	39	60	10	–	25	104	34	79
Oxford, West	75	75	75	75	45 25	10 00	16 75	17 30	18 75	6 00	52 60	4 00	10 00	24 00	–	–	–	–	–	–	–	–	–	–	11	20
Penobscot County	1 50	1 50	75		–	–	25 00	5 00	8 50	–	9 00															
Penobscot and Aroostook	1 00	50	50	50	8 00	–	5 25	75	5 00	–	20 75	3 50	–	–	1	10	12	4	8	8	–	59	32	31	20	10
Penobscot, West	1 00	–	50	–	52 00	1 75	21 25	9 60	25 25	9 25	50 85	1 75	–	5 00	14	17	21	4	12	14	2	100	51	23	8	51
Penobscot, North	50	25	25	25	2 75	75	6 75	2 00	12 00	1 00	18 99	–	–	8 35	4	16	18	6	9	11	–	84	49	1	–	12
Penobscot, Central	–	–	25	50	10 00	–	9 60	1 75	3 50	1 00	21 90	1 50	–	–	8	29	13	–	16	8	2	88	30	34		14
Piscataquis, East	75	50	75	–	5 00	–	1 50	–	2 50	–	3 05	–	–	11 20	1		7	1	5	10	2	44	35	9	1	9
Piscataquis, Central	25	–	25	–	4 00	–	7 75	–	4 00	7 75	11 75	3 00	–	–	7	22	14	–	19	13	–	75	58	40	19	

Piscataquis, West........																									
Sagadahoc..............	3 50	6 75	3 50	1 75	67 00	22 55	61 50	4 50	24 00	-	33 25	8 00	16 25	113 50	13	35	27	12	50	31	8	300	81	54	22	96
Somerset, East..........																									
Somerset, Central........	75	1 75	75	1 00	23 00	-	26 00	1 75	13 50	-	18 25	15 00	12 25	144 00	31	23	35	15	72	48	8	352	76	75	30	48
Somerset, West.........																									
Waldo County..........	-	-	-	-	13 50	13 50	9 00	-	12 00	-	20 00	-	-	-	9	23	20	5	5	11	15	103	40	45		
Waldo and Penobscot....	3 00	-	1 75	1 50	29 75	8 50	24 00	1 50	6 75	-	112 00	-	-	3 52	16	20	14	10	10	12	10	150	75	60	18	200
Waldo, North...........	1 25	1 25	1 25	1 25	32 25	3 00	11 25	2 25	4 00	-	24 25	-	-	25 00	9	8	-	12	12	9	8	54	30	22	-	12
Washington County.....	5 00	4 50	4 00	2 75	70 25	19 25	20 00	4 50	18 25	2 50	57 75	16 00	1 00	45 70	29	32	30	9	3	24	5	159	34	56	58	83
Wash., Machias P'k As'n.	3 25	1 75	1 75	1 00	29 00	3 50	23 00	1 00	9 00	-	74 60	16 00	21 30	-	11	16	10	6	6	18	-	91	38	24	20	179
Washington, West... ...	4 25	8 50	3 75	1 50	62 30	7 75	10 70	4 50	15 00	5 00	59 25	18 50	12 00	79 41	8	7	11	10	7	21	-	93	42	14	12	72
York County...........	-	6 50	1 50	1 00	20 00	5 00	19 75	-	6 00	-	126 95	-	-	56 00	18	23	26	3	83	11	4	262	46	27	3	58
York, Buxton and Hollis,	-	-	-	-	7 75	1 00	1 50	-	-	-	25 85	-	-	3 00	7	25	2	3	53	35	2	127	18	20	9	50
York, Shapleigh & Acton.	3 00	1 50	3 00	1 50	36 50	25 00	8 00	4 50	6 25	5 00	58 00	1 00	1 50	10 00	7	15	10	6	34	17	3	146	32	21	10	25
York, Ossipee Valley Ass'n	-	-	-	-	13 00	2 00	10 00	4 00	3 00	-	50 00	2 00	-	13 00	26	30	29	12	58	48	20	349	120	24	12	23

FARM EXPERIMENTS,

Conducted at Maine State College Farm to May 1st, 1885.

By G. M. Gowell, Farm Superintendent.

Experiment No. 13.

The question, Can profitable crops be grown continuously by use of commercial fertilizers, but without aid from animal manure, presses itself forward for examination.

A field of five and one-half acres of uniform clay loam soil, underlaid by compact clay subsoil, offered opportunities for this experiment upon plots sufficiently large to show their products and costs, in actual field culture.

Previous to 1882, this field had been in grass many years, and was much reduced in fertility. It was used in 1882 and 1883 as a fertilizer test field, with the plots running in an opposite direction to those of the present plan, and cropped with beans each year.

This season it was divided into nine plots, each one of which contained one-half acre or more, and received the kind and quantity of fertilizing material as indicated in the accompanying plan. The field was sown to barley, using two and one-half bushels of seed per acre, and seeded to Timothy and Red Clover.

Plot.	Fertilizer Per Acre.	Cost of Fertilizer per Acre.	Yield of Barley per Acre.
No. 1.	Bradley's X. L. Superphosphate, 500 lbs.	$10.00	37. bushels.
No. 2.	Unleached Ashes from mixed wood, 75 bushels.	$15.00	38.8 "

Plot.	Fertilizer Per Acre.	Cost of Fertilizer per Acre.	Yield of Barley per Acre.
No. 3.	Rockland Lime, 12 casks.	$12.50	22.5 bush.
No. 4.	Raw Bone, 500 lbs.	$9.50	27.8 "
No. 5.	Dissolved Bone, 500 lbs.	$10.00	25.2 "
No. 6.	Nothing.	-	22.5 "
No. 7.	Muriate of Potash, 200 lbs.	$5.00	31.5 "
No. 8.	Sulphate of Ammonia, 200 lbs.	$9.00	18. "
No. 9.	Bradley's X L Superphosphate, 500 lbs.	$10.00	38.2 "

It is proposed to apply, each season, to each plot, the same kind of fertilizing material that it has received this year, and pursue a course of crop rotation in which Red Clover shall have a place. Other questions, aside from the leading one, are to be studied.

First: The comparison of raw bone with dissolved bone.

Second: Are the results of ashes upon this soil to be attributed to the lime, or potash which they contain? The products from the lime plot and the potash plot must settle this point.

Third: What will be the plant-producing capacity of the unmanured plot, after a series of years? or, will a clay soil become entirely exhausted of its fertility when subjected to thorough mechanical working, and crop rotation?

The experiment offers opportunities for study in other directions.

Experiment No. 14.

Relating to the Feeding Value of Purple Hulless Barley.

In the spring of 1882 a few quarts of Purple Hulless barley were received from the Department of Agriculture, and grown with favorable results. In 1883 its yield in field culture, on rich heavy clay, was forty-two bushels per acre. In 1884, on fairly fertile soil, our entire crop averaged upwards of thirty-five bushels per acre.

Having no knowledge whatever of its feeding value, the following trial was made comparing it with common six-rowed barley of good quality, and also with good mixed corn meal:

Four thrifty Chester pigs, five months of age, with a united weight of 597 lbs., whose feed had been corn meal and wheat bran, were fed for thirty days with twenty-five pounds of common six-rowed barley, ground and moistened with water. At the end of the period they weighed 743.5 lbs., a gain of 146.5 lbs., and had consumed 750 lbs. of meal; 5.12 lbs. of barley meal being required to produce one pound of growth.

The feed was then changed to Purple Hulless barley, ground and moistened with water as before. Twenty-five pounds of this was fed daily for thirty days, at the end of which time they weighed 913 lbs., having gained 169.5 lbs. from 750 lbs. of meal; 4.425 lbs. of Hulless barley being required for each pound of live weight gained.

The feed was then changed to corn meal, moistened as before, thirty pounds being fed daily. At the end of this thirty-day period their weight was 1078 lbs., a gain of 165 lbs. for the 900 lbs. of corn meal fed; 5.45 lbs. of meal being required to produce each pound of live pork.

In the first period the amount of food furnished was greater in proportion to the total live weight of animals, than it was in either of the others, and should have been more productive of gain than a smaller ration of twenty pounds, which would have corresponded in volume with 25 lbs. of food for 750 lbs. of animal weight in the second period, and 30 lbs. of food for 900 lbs. of animal weight in the third period.

One bushel of common six-rowed barley, weighing 48 lbs., produced 9.37 lbs. of live pork.

One bushel of Purple Hulless barley, weighing 62 lbs., produced 14 lbs. of live pork.

One bushel of mixed corn, weighing 56 lbs., produced 10.27 lbs. of live pork.

The results of this test, although covering a period of ninety days, cannot be accepted as establishing the comparative feeding values of these grains, but they do indicate very strongly that Hulless barley has a high feeding value, and if sustained by future trials at stall and pen, must be regarded—from its vigor, productiveness and heavy weight—as a valuable crop for the stock-raising farmer.

Experiment No. 15.

Difference Between Live and Dressed Weights of Pigs.

Thirteen Chester pigs were taken from their dams at eight weeks of age, and fed upon skimmed milk, corn meal and wheat bran, in moderate quantities. After five months of age they were given all they would readily consume of a mixture of four parts of corn meal and one part of wheat bran, by weight, moistened with water and skimmed milk. Two months of this feeding showed that 4.78 lbs. of meal and bran were required to produce each pound of live pork, and that the food required to produce each pound of live pork cost just six cents. At seven months of age they were in fine condition, but not excessively fat, with the exception of No. 11. He had been, throughout the whole time, larger and fatter than his mates. They were weighed and immediately slaughtered. Eighteen hours afterwards the weights of the carcasses, tongues and rough fat were taken. Had their feeding been continued an additional sixty days, I have no doubt the average shrinkage of the entire lot would not have exceeded ten per cent of their live weights.

Pig.	Live Weight.	Dressed Weight.	Shrinkage.	Per Cent Shrinkage.
No. 1	247.5 lbs.	207 lbs.	40.5 lbs.	16.3
" 2	252.5 "	212 "	40.5 "	16
" 3	221 "	191 "	30 "	13.5
" 4	230 "	188 "	42 "	18.2
" 5	252 "	209 "	43 "	17
" 6	258 "	208 "	50 "	19.3
" 7	245 "	201 "	44 "	17.9
" 8	249 "	209 "	40 "	16
" 9	266 "	219 "	47 "	17.6
" 10	237 "	202 "	35 "	14.7
" 11	330 "	303 "	27 "	8.18
" 12	293 "	242 "	51 "	17.4
" 13	283 "	241 "	42 "	14.8

REPORT OF COMMISSIONERS ON CONTAGIOUS DISEASES OF CATTLE.

In conformity to the law, the Commissioners on Contagious Diseases of Cattle submit the following report for the year ending June 15, 1885:

The Commissioners are glad to be able to report that their duties for the year have been comparatively light. There has been no appearance during the year of any contagious disease among the cattle in the State. While many other States have been subjected to serious losses by contagious pleuro-pneumonia, we are able to report that our State is free and clear from this and all other contagious diseases among its cattle.

SCAB.

The attention of the Commissioners has been called to several instances of the appearance of the disease known as Scab, among sheep. This is a well-known disease and needs no description here. It is highly contagious, and is transmitted by contact with diseased animals and by contact with runs where diseased animals have been yarded or pastured. It is not a fatal disease, unless, through the neglect of those who have them in charge, proper restoratives are not administered.

April 11th, notice was received of the appearance of Scab in a flock of twenty-one sheep belonging to M. G. Blake, West Falmouth. The disease was introduced through the purchase of a stock ram from a car-load of sheep brought in from Canada for slaughter. The sheep were examined by George H. Bailey, the Veterinarian of the Commission, who pronounced the disease to be Scab.

April 13th, Dr. Bailey visited flocks of sheep in the town of Dayton, belonging to Ira C. Hill, Nat. Buzzell and Cyrus K. Smith, and found them affected with Scab.

April 14th, the flock of Gorham Whitney, West Falmouth, was visited and found diseased with Scab.

The owners of these flocks were directed to quarantine them on their own premises, under the penalty of the law, until cured of the disease. The sheep have been treated and kept by their owners and without expense to the State, except in the case of the flock of M. G. Blake, where a settlement has not yet been made.

HOG CHOLERA.

The disease known as Hog Cholera has appeared in numerous instances at several points in the State, and has occasioned considerable losses. Legal notice has been served on the Commissioners in two cases, and the hogs were condemned and destroyed without expense to the State.

GLANDERS.

The Commissioners were notified by the municipal officers of Topsfield of cases of glanders in that town. February 9th, Dr. Bailey was directed to visit the cases and determine their character. He did so, and found two horses had died before his arrival. Another case was found in a horse belonging to a Mr. Noyes of that town, and the horse was condemned, prized and destroyed. The amount of the appraisal was thirty-six dollars and seventy-five cents.

May 9th, notice was received from municipal officers of Gorham, of a case of glanders in a horse owned by Hinkley & Son. An examination found no case and the horse was discharged.

Z. A. GILBERT, Pres't.
G. H. BAILEY, Sec'y. } *For the Commission.*

REPORT

OF THE

MAINE FERTILIZER CONTROL

AND

Agricultural Experiment Station.

ANALYSIS OF FERTILIZERS

For the Months of April, May and June,

1885.

BOARD OF MANAGERS.

PROF. WALTER BALENTINE, ORONO.
Professor of Agriculture in the Maine State College.

HON. Z. A. GILBERT, NORTH GREENE,
Secretary Maine Board of Agriculture.

BENJAMIN F. PEASE, ESQ., Cornish.
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Officers of the Board.

HON. Z. A. GILBERT, President.
HON. S. L. BOARDMAN, Secretary.
WILLIAM DOWNS, ESQ., Treasurer.

Officers of the Station.

WHITMAN H. JORDAN, ORONO,
Director* and Chemist.

JAMES M. BARTLETT, ORONO,
Assistant Chemist.

GILBERT M. GOWELL, ORONO,
Superintendent Field and Feeding Experiments.

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* Prof. Walter Balentine was Acting Director until July 1st.

REPORT.

The work contemplated by the act establishing the Maine Agricultural Experiment Station may be classed under two heads:

(1). *Work of Inspection.* This involves the sampling and analysis of commercial fertilizers, the analysis of cattle foods, the examination of the purity and quality of agricultural seeds, and, so far as is possible, an inquiry into the healthfulness and purity of articles used as human food.

(2). *Work of Experiment and Investigation.* This involves field experiments in regard to the use of fertilizers, methods of planting and of cultivation, the relative value of varieties; also feeding experiments with a view to solving questions that pertain to meat and milk production. More or less laboratory investigation must accompany these experiments, this being in some cases the most laborious part of the work. The insect pests of the State should also receive attention.

Besides the work directly called for by the provisions of the act establishing the Station, it is conceived to be entirely in accordance with the spirit of the act that the Station should constitute, so far as is possible, a bureau of information, or of consultation.

Science and practice have made known many facts and principles that so far have found a very imperfect application to our agriculture, and it is properly the business of the Station to aid in the use of knowledge already acquired, as well as to discover new facts and principles.

The Station desires, therefore, to enter into as close contact and sympathy with the agriculture of the State as is possible. To this end it is hoped that farmers will feel free to correspond with the Station. While each farmer must to a great extent regulate his practice in accordance with his own experience under the special conditions surrounding him, there are many questions concerning

fertilizers, foods, milk and other farm products, insects, &c., in regard to which a correspondence with the Station might prove helpful. It will certainly be of great benefit to the Station to be informed in regard to anything of a new or untried character, and by free intercourse with the thinking farmers of the State it can be kept fully alive to the questions of the day that are of most pressing importance. It is especially requested that farmers bring to the notice of the Station anything new that demands investigation, and all such matters shall receive the attention that time and means will allow.

The act establishing the Station was not approved until March 3d, and the organization of the Station was not completed until early in April. The work of equipment was then at once begun. A portion of the room in the College Chemical Laboratory, devoted to the use of the students, was set apart for the use of the Station. This has been partitioned off from the remainder of the laboratory and quite thoroughly equipped with apparatus, and proves to be a fairly convenient and efficient working laboratory. A large and pleasant room in the White Building has been granted to the Station for use as an office, which will be the headquarters of the Station.

The first and most pressing work that demanded attention was the sampling and analysis of the commercial fertilizers sold in the State. It would have been well if this work could have been accomplished so early as to have made the results available while farmers were making purchases of fertilizers, but, owing to the necessary delay in equipping the laboratory for rapid work, the analyses were not executed so early nor so rapidly as will be the case hereafter. The amount of work accomplished is also less than can be profitably done after this year. The results, so far as reached, are herewith submitted.

A system of plots for field experiments has been laid out, and the relative production of the plots under uniform conditions and treatment is being determined this season, this being necessary preliminary work in all reliable field experiments.

It is hoped that the farmers of the State will bear in mind that the work of an experiment station must be developed gradually, and that substantial and trustworthy results are to be reached only after the lapse of considerable time.

It is eminently proper to state that the Trustees and Faculty of the State College have done all in their power to advance the inter-

ests of the Station by furnishing such facilities for the accomplishment of its work as they were able.

W. H. JORDAN,
Director.

FERTILIZERS.

The inspection of the various brands of fertilizers sold in the State has for its object (1) the comparison of the actual composition of these brands with the guaranteed composition, and (2) the determination of their relative values. In carrying out this inspection the fertilizers must be sampled in the hands of dealers or consumers, analyzed, and their values calculated on the basis of ruling commercial prices. So far forty-eight samples have been examined, which were selected from twenty brands.

SAMPLING.

The value of the results of inspection depends primarily upon the sample. It is absolutely necessary that the sample be neither better nor worse than the goods, but exactly the same, for otherwise either the manufacturer or the consumer will be placed at a disadvantage. It is not so simple a matter to obtain a correct sample of a package of fertilizer as some may imagine, and the provision of the law that places the sampling in the hands of the Director of the Station, or some person or persons he may deputize, is a wise one, as this gives fair assurance that this part of the work will be done correctly with the observance of certain precautions. The samples, so far as analyzed, have been selected by the following named gentlemen:

Prof. Walter Balentine,
Hon. Z. A. Gilbert,
Hon. Edward Wiggin.

VALUABLE INGREDIENTS.

The ingredients of commercial fertilizers upon which both their agricultural and commercial values depend are nitrogen, phosphoric acid in its three forms, and potash. The only other ingredients that are ever found in the markets for agricultural purposes are sulphuric acid and lime, and these are obtained so cheaply in plaster and burned lime that they may properly be ignored in estimating the

commercial value of a fertilizer that contains the other much more valuable ingredients.

Nitrogen may exist in mixed fertilizers in three forms, viz: as nitric acid, ammonia, and in the organic form. These forms of nitrogen are supplied from nitrate of soda, sulphate of ammonia, dried blood, fish, &c., these being the materials that manufacturers put into mixed goods in order to furnish the small percentage of nitrogen which they contain. These nitrogenous fertilizers are in the markets, however, in the unmixed condition.

The three forms of phosphoric acid found in fertilizers are designated as soluble, reverted and insoluble.

The soluble form is that which is readily dissolved in cold water, and is produced by treating bone or some mineral phosphate with sulphuric acid (oil of vitriol).

The reverted form is that which is insoluble in water, but is soluble in ammonium citrate. This form has undoubtedly nearly if not quite the same agricultural value as the soluble.

The available phosphoric acid is the sum of the soluble and reverted. The insoluble form is that which is neither soluble in water nor ammonium citrate.

There are fertilizers in the markets that furnish no other valuable ingredient than phosphoric acid, such as dissolved South Carolina rock and dissolved bone black.

Potash is supplied to mixed fertilizers by the use of sulphate of potash, muriate of potash and kainite. For most purposes the agricultural value of these three forms is practically the same.

Instead of buying mixed fertilizers, many farmers now prefer to purchase the unmixed standard goods that are mentioned above, and do their own mixing. This can easily be done, and this method has the advantage of allowing the farmer to select the ingredients that he buys and suit them to his special needs, rather than buy the three ingredients mixed together in whatever proportions the manufacturer sees fit to compound them.

ANALYSIS.

The methods of analysis followed have been those adopted by the last convention of official chemists, held in Philadelphia in August, 1885, and are those which are in use in other experiment stations.

VALUATION FOR 1885.

The following are the prices at which the nitrogen, phosphoric acid and potash in commercial fertilizers are valued for 1885, and are uniform with the prices adopted for Connecticut, Massachusetts and New Jersey:

Nitrogen, in nitrates, ammonia salts, guano, dried and finely ground fish, dried and finely ground blood, tankage, ammonite, cotton-seed and linseed meal, and castor pomace	18	cents.
" " fine ground bone	18	"
" " medium bone	16	"
" " coarse medium bone	14	"
" " coarse bone, horn shavings, hair and fish scrap	10	"
Phosphoric acid, soluble in water	9	"
" " " " Am. Citrate (at 65c.)	8	"
" " insoluble, in dried and finely-ground fish and in fine bone	6	"
" " " " fine medium "	5½	"
" " " " medium bone	5	"
" " " " coarse medium bone	4½	"
" " " " " bone	4	"
" " " " fine ground rock phosphate and in bone black	2	"
" " " " mixed fertilizers	4½	"
Potash, in high grade sulphate	7¼	"
" " the muriate and in kainite	4¼	"

The nitrogen in mixed fertilizers is assumed to be of the best quality, and is therefore valued at eighteen cents.

The above are *commercial*, and not agricultural, values, and are based upon the *retail* prices for which such *raw* materials as nitrate

of soda, sulphate of ammonia, dried blood, ammonite, dry ground fish, plain superphosphates, sulphate of potash, and muriate of potash, could be bought in *the markets*, *for cash*, early in March, 1885. They are prices at which nitrogen, phosphoric acid and potash can actually be obtained in the large markets.

These values take no account of the cost of transportation from the market to the consumer, nor of the expense of mixing the raw materials in the manufacture of mixed fertilizers, nor of commissions, payment on time, &c. The cost of transportation is a variable factor, depending upon the location of the consumer, and it remains for the consumer to determine whether he can mix the raw materials cheaper than the manufacturer is doing it for him. It is not strange, therefore, that the estimated values of mixed goods fall somewhat below the selling prices, but it should not be assumed, on the other hand, that the above named raw materials cannot be purchased under a special arrangement for somewhat lower rates than those taken as the basis of valuation. The prices adopted are believed to be such as will protect consumers from fraud and excessive overcharge, and at the same time do no harm to the interest of manufacturers. The ingredients of fine bone receive a higher valuation than those of coarse bone, the degree of fineness being considered an important element in the cost of manufacture. "Fine bone" is that which will pass through a sieve with meshes of one-fiftieth of an inch, and "coarse bone" is that larger than one-sixth of an inch, the other grades coming between these.

It would be desirable, for some reasons, if the Station's valuations could be made to represent the commercial values of the fertilizers delivered to the consumer. This is not possible with any satisfactory degree of accuracy. The composition of mixed goods, the rates of transportation, and the expense of retailing through agents on the credit system, are factors so variable that they cannot be accounted for in the basis of valuation. It is doubtful, in fact, if one of these factors, the selling on credit, is a proper element of cost to be considered. Other elements of cost involved in the present methods of trade might be largely diminished, as for instance expense of retailing. This, however, cannot be properly discussed here.

If consumers will add to the Station's valuations the expense of transportation from the nearest large market, they will have the price at which it is possible for them to obtain an amount of the valuable ingredients equivalent to those contained in the goods valued. There will still remain the expense of mixing to be credited to the cost of mixed goods.

FERTILIZERS.

Station Number	BRAND.	MANUFACTURER.	SAMPLED BY	SAMPLED AT	Station Number.
1	Bradley's X L Superphosphate	Bradley Fertilizer Co., Boston, Mass.	Prof. W. Balentine	Bangor	1
11	" " "	" " " " "	Z. A. Gilbert	Portland	11
21	" " "	" " " " "	" "	Mechanic Falls	21
24	" " "	" " " " "	" "	Lewiston	24
2	Cumberland Bone Superphosphate	Cumberland Bone Co , Portland, Me	Prof. W. Balentine	Bangor	2
10	" " "	" " " " "	Z. A. Gilbert	Portland	10
22	" " "	" " " " "	" "	Mechanic Falls	22
23	" " "	" " " " "	" "	Lewiston	23
34	" " "	" " " " "	Prof. W. Balentine	Dover	34
5	Standard Superphosphate	Standard Fertilizer Co., Boston, Mass.	Prof. W. Balentine	Bangor	5
20	" "	" " " " "	Z. A. Gilbert	Mechanic Falls	20
32	Bay State Bone Superphosphate	J. A. Tucker & Co., Boston, Mass.	Prof. W Balentine	Dover	32

ANALYSIS OF FERTILIZERS.

Station Number	BRAND.	Nitrogen		Phosphoric Acid.							Potash.		Station Valuation.	Selling Price.	Moisture.	Station Number
									Available.							
		Found.	Guaranteed.	Soluble.	Reverted.	Insoluble.	Total Found.	Total Guaranteed.	Found.	Guaranteed.	Found.	Guaranteed.				
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c	p. c.	p. c.	p. c.	p. c.	p. c			p. c.	
1	Bradley's X L Superphosphate	3.00		8.32	2.08	1.47					2.23		$32 33		15.1	1
11	" " "	1.67		9.68	2.17	1.35					1.68		29 55		15.65	11
21	" " "	2.29		9.69	1.83	.96					2.14		31 29		13.59	21
24	" " "	3.76		8.56	1.42	1.38					3.04		35 02		16.35	24
	Average	2.68	2 50 to 3.25	9.06	1.88	1.29	12.23	11.00 to 14.00	10.94	9.00 to 11.00	2.27	2 00 to 3.00	32 05	$40 00		
2	Cumberland Bone Superphosphate	2.30		7.28	2.26	1.02					3.00		28 47	38 00	22.30	2
10	" " "	3.02		7.04	2.38	.80					3.25		30 82	40 00	24.40	10
22	" " "	2.53		6.94	1.67	1.50					3.08		28 29		22.65	22
23	" " "	2.85		6.96	2.24	1.35					3.32		30 40		16.64	23
34	" " "	2.91		7.97	1.54	1.22					3.76		31 59		20.85	34
	Average	2.72	2.00 to 3.00	7.24	2.02	1.18	10.44	10.00 to 14.00	9.26	9.00 to 11.00	3.28	3.00 to 4.00	29 91	39 00		
5	Standard Superphosphate	2.40		8.91	1.49	1.12					2.78		30 64		15.15	5
20	" "	2.23		5.52	3.30	2.13					2.68		27 45		15.16	20
	Average	2.35		7.22	2.40	1.63	11.25		9.62		2.73		29 05	40 00		
32	Bay State Bone Superphosphate	3.33		7.42	.95	1.03	9.40		8.37		1.04		28 67		22.88	32

FERTILIZERS.

Station Number	BRAND.	MANUFACTURER.	SAMPLED BY	SAMPLED AT	Station Number
4	Soluble Pacific Guano	Glidden & Curtis, Boston, Mass	Prof. W. Balentine	Bangor	4
14	" " "	" " " "	Z. A. Gilbert	Greene	14
26	" " "	" " " "	" "	Auburn	26
56	" " "	" " " "	Edward Wiggin	Presque Isle	56
3	Bay State Fertilizer	Clark's Cove Guano Co., New Bedford, Mass	Prof. W. Balentine	Bangor	3
17	" " "	" " " "	Z. A. Gilbert	West Poland	17
36	" " "	" " " "	Prof. W. Balentine	Foxcroft	36
57	" " "	" " " "	Edward Wiggin	Presque Isle	57
6	Stockbridge Corn Fertilizer	Bowker Fertilizer Co., Boston, Mass.	Z. A. Gilbert	Portland	6
35	" " "	" " "	Prof. W. Balentine	Dover	35
52	" " "	" " "	Z. A. Gilbert	West Farmington	52

ANALYSIS OF FERTILIZERS.

Station Number	BRAND.	Nitrogen		Phosphoric Acid.							Potash.		Station Valuation.	Selling Price.	Moisture.	Station Number
		Found.	Guaranteed	Soluble	Reverted.	Insoluble.	Total Found.	Total Guaranteed.	Available. Found.	Available. Guaranteed	Found.	Guaranteed.				
		p. c	p. c	p c	p. c.	p c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.			p. c.	
4	Soluble Pacific Guano	2.60		6.96	1.54	3.23					3.57		$30 29		14.2	4
14	" " "	2.96		6 86	2 16	2.90					3.49		31 94		19.69	14
26	" " "	2.79		7.49	2.11	2.62					1.40		30 45		15.90	26
56	" " "	1.89		7.44	1.80	2.92					4.27		29 32		13.63	56
	Average	2.56	2.00 to 3.00	7.17	1.90	2.92	11.99	12.00 to 14.00	9.07	8.00 to 11.00	3.18	2.00 to 3.50	30 50	$40 00		
3	Bay State Fertilizer	3 10		8.24	1.52	1.63					2.52		32 03		15.25	3
17	" "	3.44		8.37	2 10	.39					2.76		33 51		17.95	17
36	" "	3.30		8.08	1.71	1.53					2.77		32 89		16.91	36
57	" "	3.30		9.18	.81	1.19					3.45		33 70		18.64	57
	Average	3.29	2.10 to 2.80	8.47	1.54	1.19	11.20	10.00 to 13.00	10.01	8.00 to 11.00	2.88	2.00 to 3.00	33 03	40 00		
6	Stockbridge's Corn Fertilizer	3.82		7.33	.41	1.20					4.04		32 11		11.80	6
35	" "	3.27		7.20	1.91	1.09					4.07		32 22		12.39	35
52	" "	3.60		6.40	1.58	1.00					4.64		31 85		22.50	52
	Average	3.56	3.25 to 4.25	6.98	1.30	1.10	9.38	7.00 to 9.00	8.28		4.25	4.00 to 5.00	32 06	45 00		

FERTILIZERS.

Station Number	BRAND.	MANUFACTURER.	SAMPLED BY	SAMPLED AT	Station Number
7	Stockbridge's Potato Fertilizer	Bowker Fertilizer Co., Boston, Mass.	Z. A. Gilbert	Portland	7
19	" "	" " "	" "	Mechanic Falls	19
38	" "	" " "	Prof. W. Balentine	Dover	38
8	Bowker's Hill and Drill	Bowker Fertilizer Co., Boston, Mass.	Z. A. Gilbert	Portland	8
18	" " " "	" " "	" "	Mechanic Falls	18
62	" " " "	" " "	Edward Wiggin	Fort Fairfield	62
43	Sagadahoc Superphosphate	Sagadahoc Fertilizer Co., Bowdoinham, Me	Z. A. Gilbert	Brunswick	43
49	" "	" " "	" "	Bowdoinham	49
50	" "	" " "	" "	Farmington	50
55	Red Beach Superior Bone Phosphate	Red Beach Plaster Co., Calais, Me.	Edward Wiggin	Presque Isle	55
60	" " "	" " "	" "	Caribou	60
61	" " "	" " "	" "	Fort Fairfield	61

ANALYSIS OF FERTILIZERS.

Station Number	BRAND.	Nitrogen		Phosphoric Acid.							Potash.		Station Valuation.	Selling Price.	Moisture.	Station Number
		Found.	Guaranteed.	Soluble.	Reverted.	Insoluble.	Total Found.	Total Guaranteed.	Available. Found.	Available. Guaranteed.	Found.	Guaranteed.				
		p. c	p. c.	p. c	p. c.	p. c.	p. c.	p. c.	p. c.	p c	p. c.	p c.			p. c.	
7	Stockbridge's Potato Fertilizer	3.57		8.27	.47	1.11					2.70		$33 09		10.10	7
19	" " "	3 57		6.18	2.08	1.07					4.66		32 22		16.10	19
38	" " "	3.67		6.58	1.02	1.64					5.35		32 71		15.50	38
	Average	3.60	3.25 to 4.25	7.01	1.19	1.27	9.47	8.00 to 10.00	8.20		4.24	5.00 to 6.00	32 67	$15 00		
8	Bowker's Hill and Drill	2.33		9.07	.62	.95					2.10		29 62		18.26	8
18	" " "	2.53		7.44	2.55	1.21					2.18		29 51		18.35	18
62	" " "	3.04		8.83	2.11	.60					2.03		32 47			
	Average	2 66	2.50 to 3.25	8.45	1.76	.92	11.13	11.00 to 13.00	10.21	9.00 to 12.00	2.10	2.00 to 3.00	30 53	40 00		
43	Sagadahoc Superphosphate	2.40		8.10	1.42	1 40					2.87		29 19		28.26	43
49	" "	2.73		8.45	1.05	1.40					3.66		31 09		26.15	49
50	" "	2.60		7.78	1.43	1.49					3.40		29 88		26.48	50
	Average	2.58	2.00 to 3.00	8.11	1.30	1.43	10 84	11.00 to 14.00	9.41	9.50 to 12.50	3.31	2.00 to 3.00	30 05	34 50		
55	Red Beach Superior Bone Phosphate	1.67		7.68	.96	.20					.44		21 91		22.8	55
60	" " "	2.05		7.68	.84	.56					1.21		24 06		19 95	60
61	" " "	2.26		8.03	.40	.71					1.58		25 21		14.71	61
	Average	1.99	2.40	7.80	.73	.49	9.02	10.90	8.53		1.08	2.26	23 73			

FERTILIZERS.

Station Number	BRAND.	MANUFACTURER.	SAMPLED BY	SAMPLED AT	Station Number
16	Acme Superphosphate	Atlantic Fertilizer Co., Boston, Mass	Z A. Gilbert	West Poland	16
25	Circle Brand, Bone and Potash	Bradley Fertilizer Co., "	" "	Lewiston	25
27	Crocker's Ammoniated Bone Superphos'te	L. L. Crocker, Buffalo, N. Y	" "	"	27
28	Crocker's Potato and Hop Fertilizer	" " " "	" "	"	28
39	Stockbridge's Pea and Bean Fertilizer	Bowker Fertilizer Co., Boston, Mass	Prof. W. Balentine	Dover	39
45	Dirigo Fertilizer	Sagadahoc Fertilizer Co., Bowdoinham, Me	Z. A. Gilbert	Bowdoinham	45
53	Farmers' New Method Phosphate	Bradley Fertilizer Co., Boston, Mass	" "	Farmington	53
59	Sea Fowl Guano	" " "	Edward Wiggin	Presque Isle	59

Station Number.	BRAND.	Nitrogen		Phosphoric Acid.							Potash.		Station Valuation.	Selling Price.	Moisture.	Station Number
		Found.	Guaranteed.	Soluble.	Reverted.	Insoluble.	Total Found.	Total Guaranteed.	Available. Found.	Available. Guaranteed.	Found.	Guaranteed.				
		p. c.	p. c.	p. c.	p. c.	p. c	p. c.	p. c.	p. c.	p. c	p. c.	p. c.			p c.	
16	Acme Superphosphate	2.49		8.64	.67	1.80	11.11		9.31		.42		$27 56		24.70	16
25	Circle Brand, Bone and Potash	2.56		1.60	4.17	6.55	12.32		5.77		2.77		27 01		7.72	25
27	Crocker's Ammoniated Bone Superphosphate	3.17		8.56	1.59	1.13	11 28		10.15		1.76		31 87		11.00	27
28	Crocker's Potato and Hop Fertilizer	2.72		7.68	1.52	1.08	10.28		9.20		6.17		32 25		14.13	28
39	Stockbridge Pea and Bean Fertilizer	2.88		7.92	1.85	1.51	11.28		9.77		2.72		31 26		13.25	39
45	Dirigo Fertilizer	2.00		2.92	3.00	2.96	8.88		5.92		2.00		21 61	$28 00	12.96	45
53	Farmers' New Method Phosphate	2.49		8.70	1.27	1.70	11.67		9.97		1.36				17.91	53
59	Sea Fowl Guano	2.57		9.09	2.79	.82	12.70		11.88		1.80		32 34		17.83	59

GROUND BONE.

Station Number	BRAND.	MANUFACTURER.	SAMPLED BY	SAMPLED AT	Station Number
9	Pure Ground Bone	Belknap & Son, Portland, Me	Z. A. Gilbert	Portland	9
12	Bone Meal	" " " "	" "	Portland	12
46	Fine Ground Bone Meal	Sagadahoc Fertilizer Co, Bowdoinham, Me.	" "	Bowdoinham	46

Station Number	BRAND.	Moisture.	Phosphoric Acid.	Nitrogen.	Station Valuation.	Selling Price.
9	Pure Ground Bone	3.00 per cent.	23.35 per cent	3.22 per cent.	$37 78	
12	Bone Meal	8.60 "	22.96 "	3.67 "	38 88	$40 00
46	Fine Ground Bone Meal	9.50 "	22.01 "	4.13 "	39 35	36 00

LICENSE FEES.

The following is a list of the manufacturers of fertilizers, whose goods are sold in Maine, who have paid license fees in compliance with the law:

Bradley Fertilizer Company, Boston, Mass.,

Bradley's X L Superphosphate	$50 00
B D Sea Fowl Guano	15 00
Original Coe's Phosphate	15 00
Bradley's Circle Brand Bone and Potash	15 00

Bowker Fertilizer Company, Boston, Mass.

Bowker's Hill and Drill Phosphate	50 00
Stockbridge Specials	15 00

L. L. Crocker, Buffalo, N. Y.

Buffalo Ammoniated Superphosphate	50 00
Potato, Hop and Tobacco Phosphate	15 00

Standard Fertilizer Company, Boston, Mass.

Standard Fertilizer	50 00

Williams, Clark & Company, New York.

Americus Ammoniated Superphosphate	50 00

Cumberland Bone Company, Portland.

Cumberland Superphosphate	50 00

United States and Canada Co-Operative Fertilizer Company, Boston, Mass.

Eureka Fertilizer	50 00

Atlantic Fertilizer Company, Boston, Mass.

Acme Superphosphate	50 00

Clark's Cove Guano Company, New Bedford, Mass.

Bay State Fertilizer	50 00

Sagadahoc Fertilizer Company, Bowdoinham, Me.

Sagadahoc Superphosphate	50 00
Dirigo Fertilizer	15 00

J. A. Tucker & Company, Boston, Mass.
Bay State Superphosphate $50 00

Red Beach Plaster Company, Calais, Me.
Red Beach Superphosphate 50 00

Glidden & Curtis, Boston, Mass.
Soluble Pacific Guano 50 00

Law Establishing the Maine Fertilizer Control and Agricultural Experiment Station.

CHAPTER 294, PUBLIC LAWS OF 1885.

AN ACT to establish an Agricultural Experiment Station.

Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows:

SECTION 1. That for the purpose of protection from frauds in commercial fertilizers, and from adulterations in foods, feeds and seeds, and for the purpose of promoting agriculture by scientific investigation and experiment, the Maine Fertilizer Control and Agricultural Experiment Station is hereby established in connection with the State College of Agriculture and Mechanic Arts.

SECTION 2. The direction and management of this station shall be committed to a board of managers, to consist of five members, namely: the professor of agriculture of the State College of Agriculture and Mechanic Arts, ex-officio; the secretary of the state board of agriculture, ex-officio, and three members to be appointed by the governor, whose terms of office shall be three years, except in the first appointment, one shall be designated to serve but one year, and one to serve two years.

SECTION 3. The board of managers shall be called together by the secretary of the board of agriculture, at such place in this state as he may designate, within thirty days of the approval of this act, for the purpose of transacting such business as may be required to put the station in operation; and thereafter the board of managers shall hold a meeting annually, at Augusta, on the Tuesday preceding the third Wednesday of January, for the transaction of business relating to the station. Other meetings may be called, on due notice, by the president, at such times and places as will best promote the objects contemplated by this act.

SECTION 4. The board of managers shall organize by the election of a president, a secretary and treasurer, who shall severally hold their offices for one year and until their successors are elected. They shall locate the station herein provided for, and shall appoint a director, who shall have the general management and oversight of the analyses, investigations and experiments necessary to carry out the purposes

named in section one of this act, and shall employ competent assistants to aid in prosecuting the work of the station. It shall, whenever public interest will be promoted thereby, publish by bulletin or otherwise, the results of its investigations and experiments, and shall make an annual report of its work to the governor and council, which shall be printed and bound with the report of the secretary of the board of agriculture.

SECTION 5. The sum of five thousand dollars, annually, is hereby appropriated to the Maine Fertilizer Control and Agricultural Experiment Station, and the governor and council, from time to time, shall draw their warrant on the state treasurer for such sums of money as are necessary to defray the expenses herein provided for, not exceeding in any one year the appropriation herein named, an account of which shall first be approved by the president and secretary of the board of managers.

SECTION 6. The board of managers shall receive no compensation for time and services rendered, but shall be reimbursed for actual expenses incurred in the performances of their duties.

SECTION 7. Any manufacturer, company, or person who shall offer, sell, or expose for sale in this state, any commercial fertilizer, the price of which exceeds ten dollars per ton, shall affix to every package, in a conspicuous place on the outside thereof, a plainly printed certificate, stating the number of net pounds in the package sold or offered for sale, the name or trade-mark under which the article is sold, the name of the manufacturer, and the place of manufacture, and a chemical analysis stating the percentage of nitrogen, or its equivalent in ammonia in available form, of potash soluble in water, and of phosphoric acid in available form, soluble or reverted, as well as the total phosphoric acid.

SECTION 8. The manufacturer, company, or person selling or offering for sale in this state, any commercial fertilizers exceeding ten dollars per ton in price shall, on or before the first day of April annually, or before offering the same for sale, procure a license from the board of managers, authorizing the sale of said fertilizers in the state, and shall pay for the same the sum of fifty dollars for a single brand, and fifteen dollars for each additional brand offered for sale; and shall furnish the secretary of the board of managers, at the time of their appointment, the names of all agents authorized by him to sell the same in this state.

SECTION 9. This act shall not apply to the article known as porgy chum, or fish scrap, or fish waste of any kind, or bone, when offered for sale unmixed with other fertilizing material; nor shall it apply to parties manufacturing fertilizers in quantities less than twenty-five tons per year, or to fertilizers in possession of dealers or agents at the time of approval of this act.

SECTION 10. The director of the station, or any person by him deputized, is hereby empowered to select from three different parcels or packages of commercial fertilizers, taken from three different sections of the state, held or offered for sale in this state, quantities not exceeding two pounds from each package, which quantities shall be for analysis, the average of the several analyses shall be taken to compare with the cer-

tificate found on the given packages, held or offered for sale; and he shall select each year, at least three samples, as aforesaid, from each brand held for sale, and shall secure these analyses at the station. The agent shall select these samples, in the presence of some representative of the company, from which the quantities are so selected, and shall deliver one-half of said samples, properly sealed by him, to said representative.

SECTION 11. The secretary of the board of managers shall register, in a suitable book kept in his office, a list of all licenses issued, and of fees received therefor, and a list of all brands of fertilizers sampled; and all license fees received by the board of managers shall be paid into the treasury of the state.

SECTION 12. Any person or party, who shall offer or expose for sale any commercial fertilizer, without complying with the requirements of sections seven and eight of this act, or shall permit an analysis to be attached to any package of such fertilizer, stating that it contains a larger percentage of any one or more of the constituents named in section seven of this act than it really does contain, shall be fined not less than one hundred dollars nor more than three hundred dollars for the first offense, and not less than two hundred dollars nor more than five hundred dollars for each subsequent offense; and the offender shall, in all cases, also, be liable for damages sustained by the purchasers of said fertilizers, *provided, however*, that the deficiency of one per cent of nitrogen, potash, or phosphoric acid claimed to be contained, shall not be considered as evidence of fraudulent intent.

SECTION 13. All acts and parts of acts inconsistent with this act are hereby repealed.

SECTION 14. This act shall take effect when approved.

[Approved March 3, 1885.]

MAINE STATE AGRICULTURAL SOCIETY.

TREASURER'S REPORT

OF

RECEIPTS AND EXPENDITURES,

FROM SEPT. 22, 1884, TO MAY 8, 1885.

RECEIPTS.

From Tickets	$14,024 85	
" Entry Fees	2,092 00	
" Land Rents	981 40	
" Water Rents	64 00	
" Advertising in Premium List	94 45	
" Check-Room	5 00	
" Peddlers' Licenses	17 50	
" Glass Blowers	30 00	
" Space at Hall	22 00	
" Storage	15 00	
" Returned Premiums	29 00	
" Sales of Materials	99 08	
" Androscoggin Agricultural Society	400 00	
" Other Sources	69 25	
		$17,943 53
" Society's Note and Draft		5,639 10
" Balance from Previous Account		560 96
		$24,143 59

EXPENDITURES.

For Premiums	$7,563 50	
" Materials and Labor	8,694 51	
" Salaries	1,600 00	
" Hay, Grain and Straw	1,379 13	
" Printing	491 37	
" Electric Lights	275 00	
" Band	175 00	
" Water Pipes	191 82	
" Water	93 09	
" Insurance	72 00	
" Taxes	93 30	
" Androscoggin Agricultural Society	400 00	
" Refunded Entry Fee	15 00	
	$21,043 72	
" Society's Note and Interest	2,684 21	
" Balance to New Account	415 66	
		$24,143 59

Financial Standing of the Society.

ASSETS.

Original Park Purchase, valued	$8,000 00
Land purchased of Bonallie	350 00
" " Mrs. Nevins	1,800 00
" " E. Cornish	500 00
" " H. W. Stewart	2,000 00
Ex. Building Boiler-House and Boiler, Pulleys and Shafting	10,000 00
Office at Main Gate	800 00
Dormitory Building	1,500 00
Stable	400 00
300 Horse Stalls	2,500 00
300 Cattle Stalls	1,800 00
Ladies' Dressing Room	250 00
Coat and Parcel Room	150 00

Sheep and Swine Pens	$500 00	
Water Pipes	500 00	
Police Headquarters	100 00	
Furniture, Tools, &c	150 00	
1 Sprinkler	150 00	
2 Horses	500 00	
		$31,950 00

LIABILITIES.

Cash Loans	$20,615 00	
2 Horses	500 00	
		$21,115 00
Assets over liabilities		$11,835 00

All the property is well insured.

Auditors' Certificate.

PORTLAND, May 8th, 1885.

This certifies that we have this day very carefully examined the Cash Accounts of Henry S. Osgood, Treasurer of the Maine State Agricultural Society, to date, and find them correctly cast, with proper vouchers for all money paid out. We have counted the Cash on hand and find it to agree with the balance upon the Cash Book.

We also find Warrants properly drawn for amounts to meet the expenditures as shown by the Cash Book.

Signed,

WM. D. PENNELL,
SAM'L F. MERRILL, } *Auditors.*

H. S. OSGOOD, *Treasurer.*

TREASURER'S OFFICE, AUGUSTA, June 25th, 1885.

H.H.NICHOLS-ENG.

MABR-DEL.

ALOPECURUS PRATENSIS, L. (*Meadow Foxtail*).

PHLEUM PRATENSE, L. (*Timothy*).

AGROSTIS CANINA, L. (*Brown Bent-Grass*).

AGROSTIS VULGARIS, With. (*Red-Top*).

CINNA ARUNDINACEA, L. (*Wood Reed-Grass*).

MARX.DEL.

MUHLENBERGIA GLOMERATA, Trin. (*Spiked Muhlenbergia*).

MUHLENBERGIA MEXICANA, Trin. (*Wood Grass*).

F.H.N Sc. MARK.DEL.

MUHLENBERGIA SYLVATICA, Tor. & Gr. (*Wood Grass*).

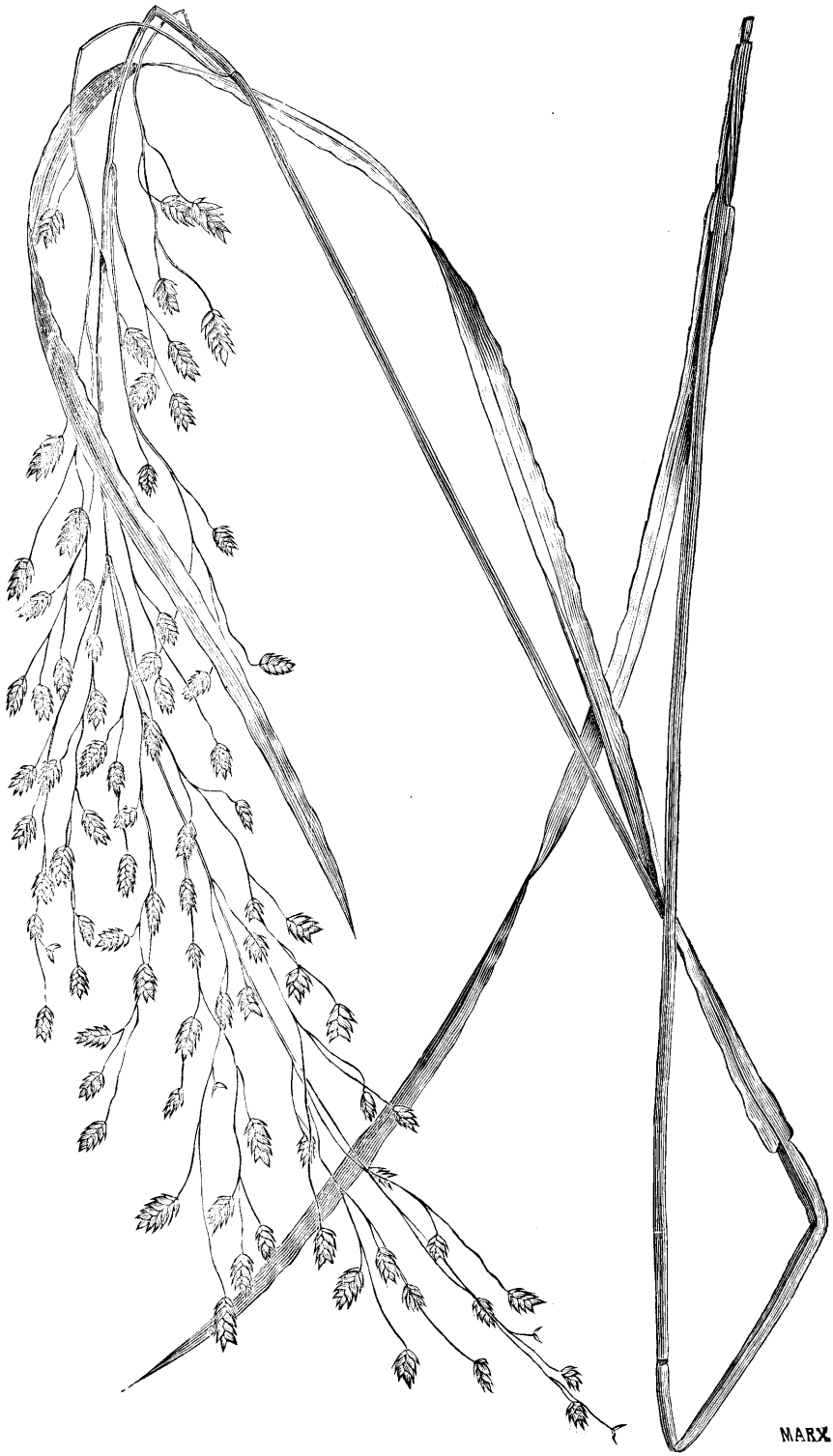
DEYEUXIA CANADENSIS, Beauv. (*Blue Joint-Grass*).

SPARTINA JUNCEA, Willd. (*Rush Salt-Grass*).

CYNODON DACTYLON, Pers. (*Bermuda Grass*).

ARX.DEL.

DACTYLIS GLOMERATA, L. (*Orchard Grass*).

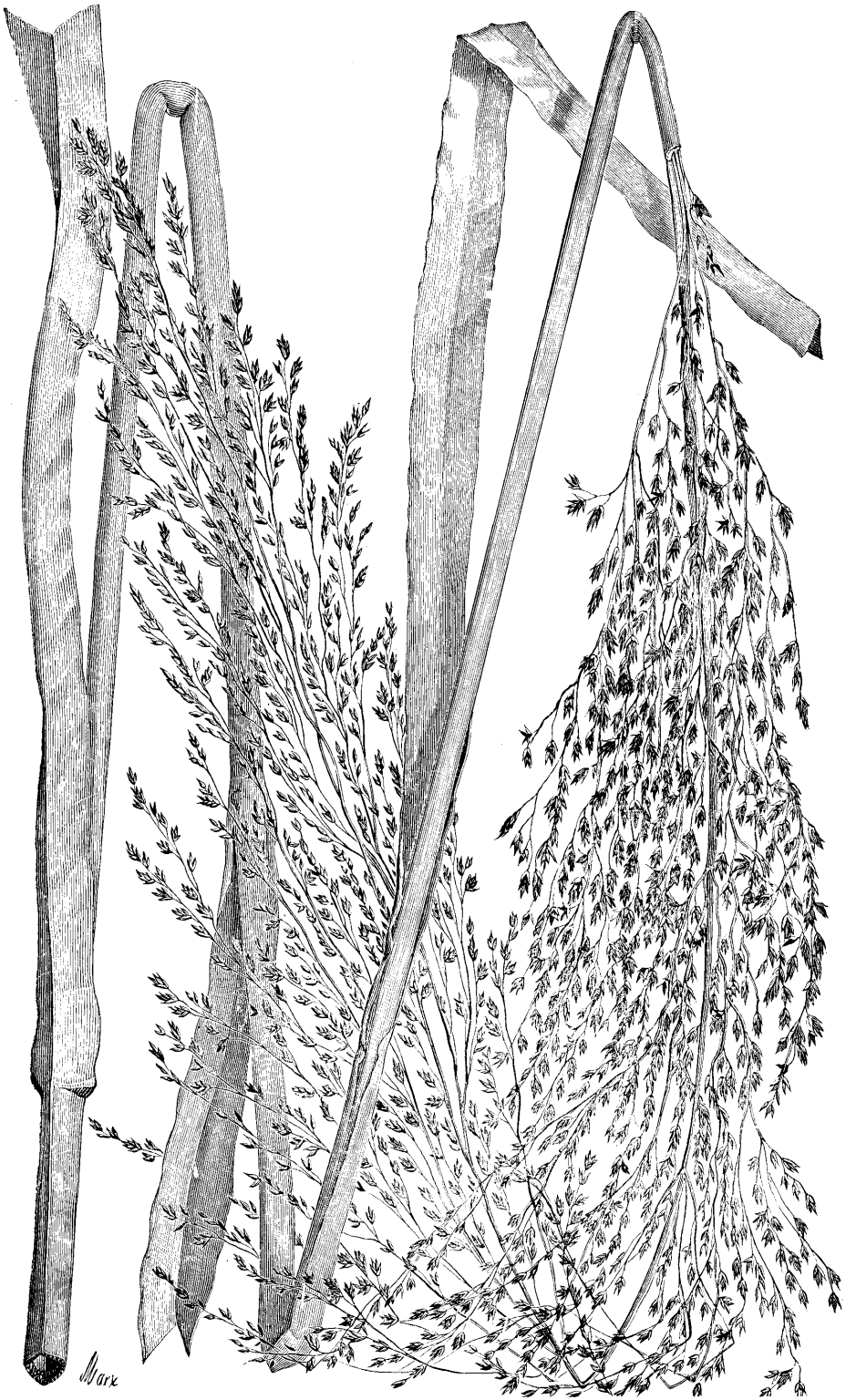


GLYCERIA CANADENSIS, Trin. (*Rattlesnake Grass*).

MARX.DEL.

NICHOLS.S

GLYCERIA NERVATA, Trin. (*Nerved Meadow-Grass*).



GLYCERIA AQUATICA, Smith. (*Reed Meadow-Grass*).

DISTICHLIS MARITIMA, Raf. (*Spike Grass*).

POA COMPRESSA, L. (*Wire Grass.*)

POA SEROTINA, Ehr. (*Fowl Meadow-Grass*).

POA PRATENSIS, L. (*Kentucky Blue-Grass*).

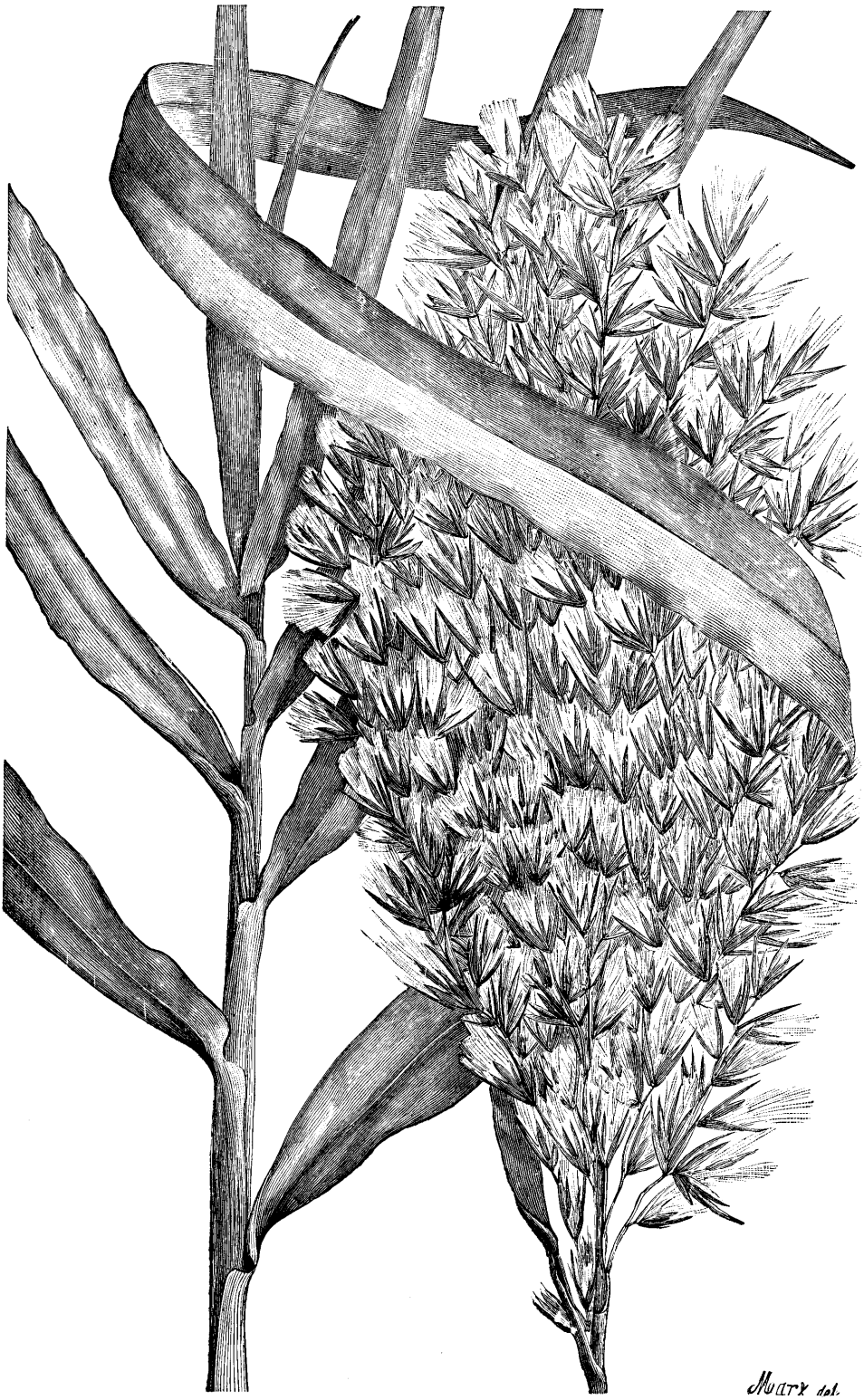
MARX.DEL. H.H.NICHOLS.ENG.

FESTUCA OVINA, L. (*Sheep's Fescue*).

FESTUCA ELATIOR, L. (*Meadow Fescue*).

A.H.NICHOLS. MARX.DEL.

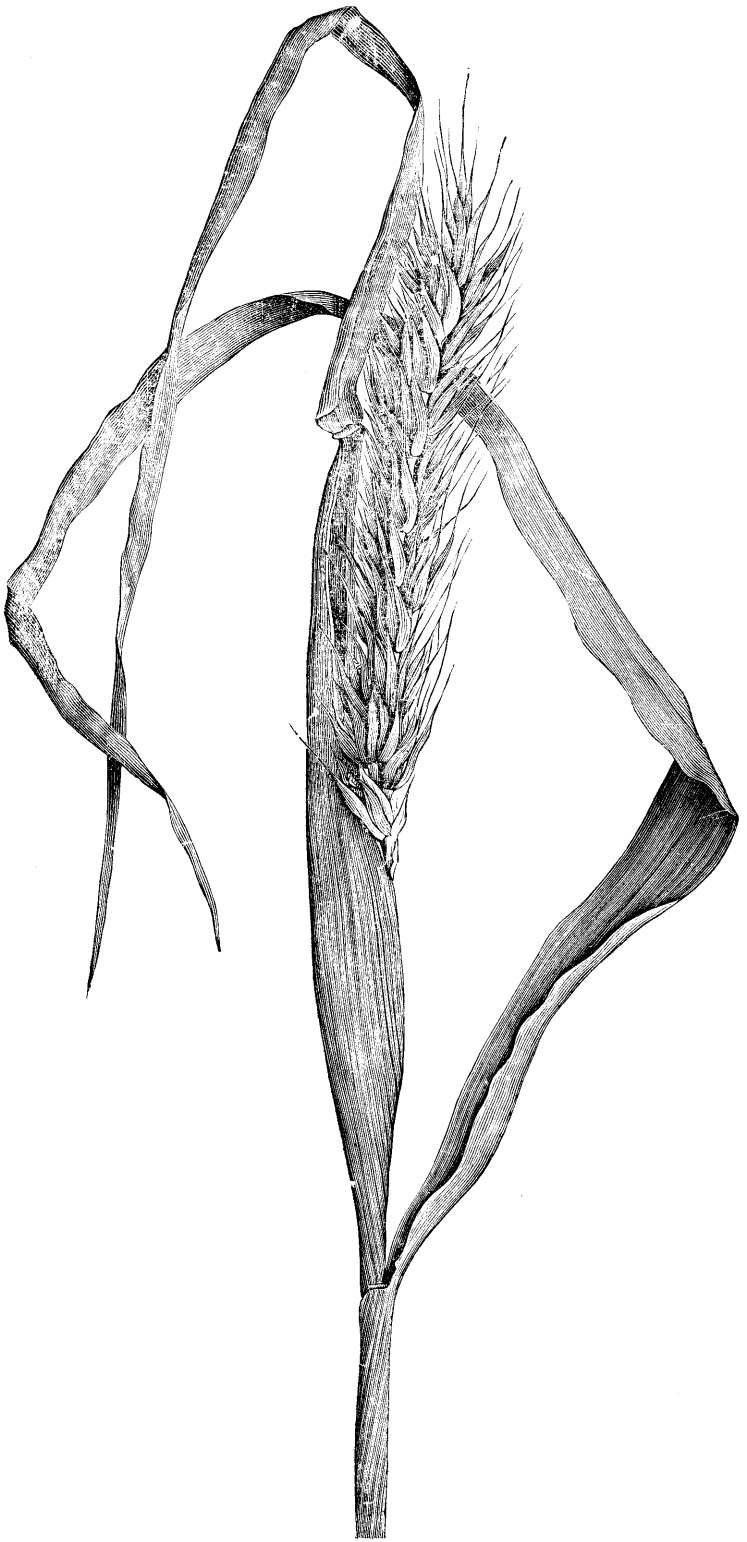
BROMUS SECALINUS, L. (*Cheat or Chess.*)



PHRAGMITES COMMUNIS, Trin. (*Reed*).

LOLIUM PERENNE, L. (*Rye-Grass*).

AGROPYRUM REPENS, L. (*Witch-Grass*).



MARX. DEL.

ELYMUS VIRGINICUS, L. (*Smooth Rye-Grass*).

ELYMUS CANADENSIS, L. (*Wild Rye*).

DANTHONIA SPICATA, Beauv. (*Wild Oat-Grass*).

AVENA STRIATA, Michx. (*Wild Oat-Grass*).

TRISETUM SUBSPICATUM, [illegible] auv.

DESCHAMPSIA CAESPITOSA, L. (*Hair Grass*).

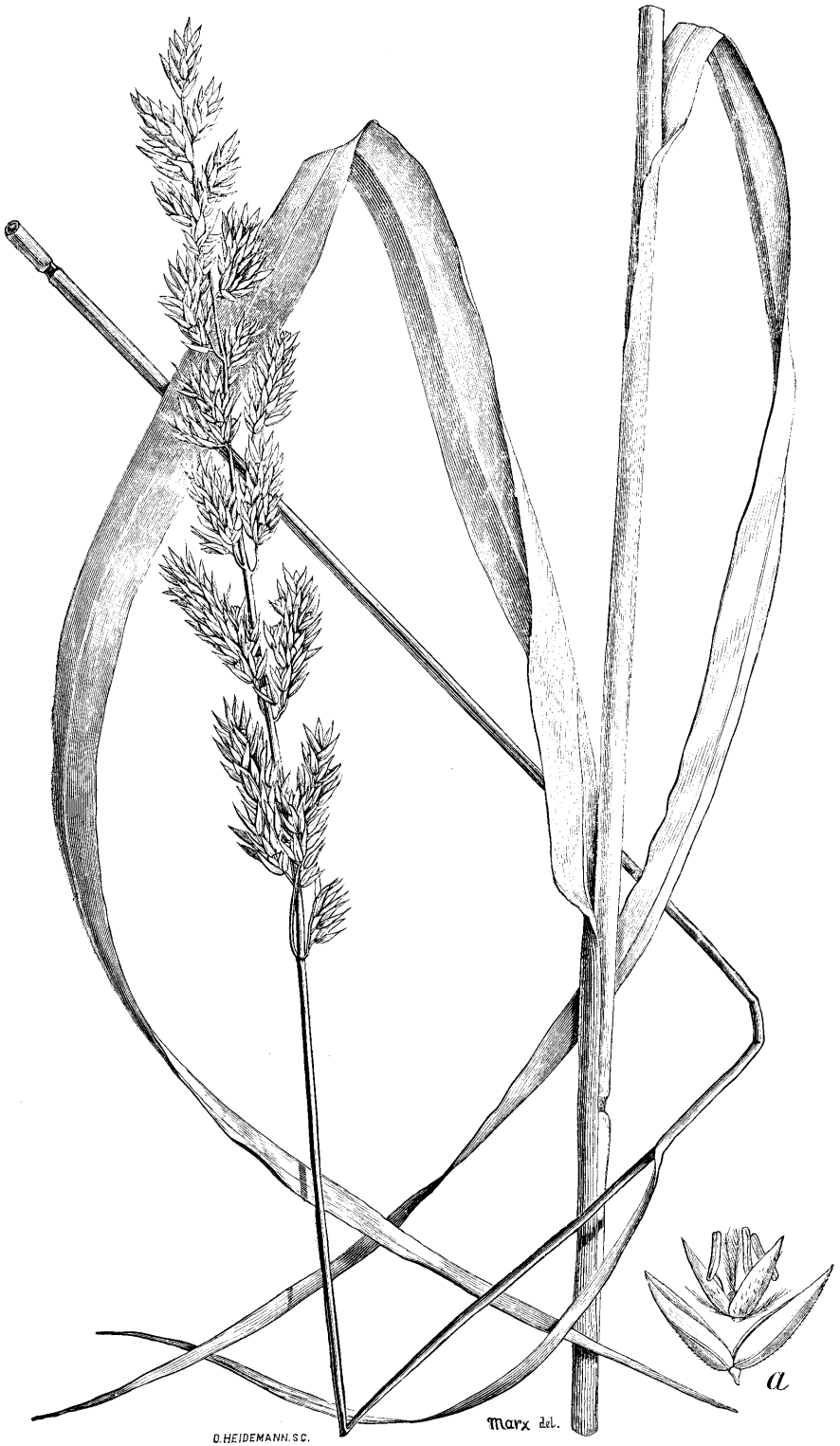
H. H. Nicholls, Sc

Moore del.

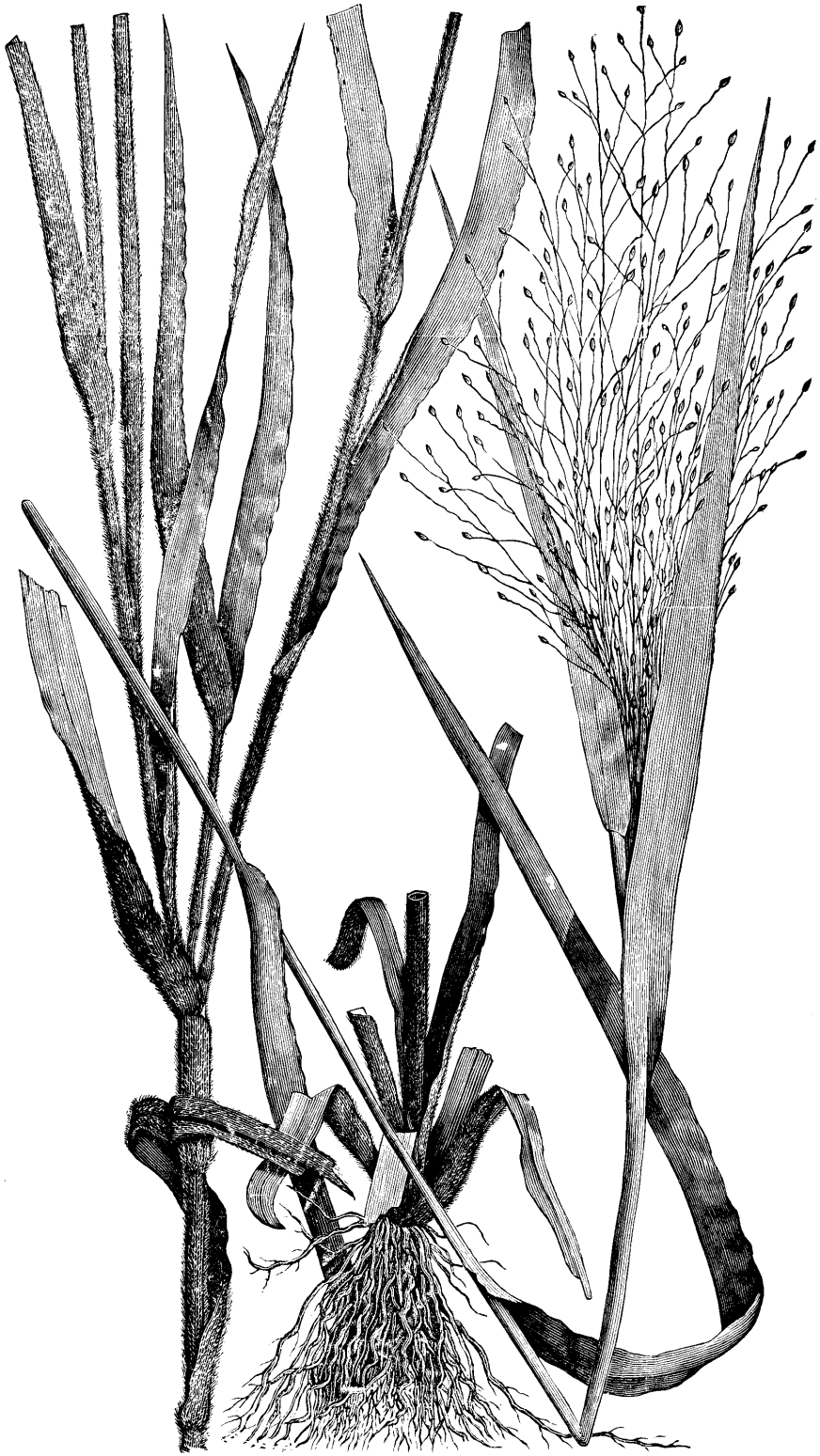
HOLCUS LANATUS, L. (*Velvet Grass*).

HIEROCHLOA BOREALIS, R & S. (*Vanilla Grass*).

ANTHOXANTHUM ODORATUM, L. (*Sweet Vernal-Grass*).

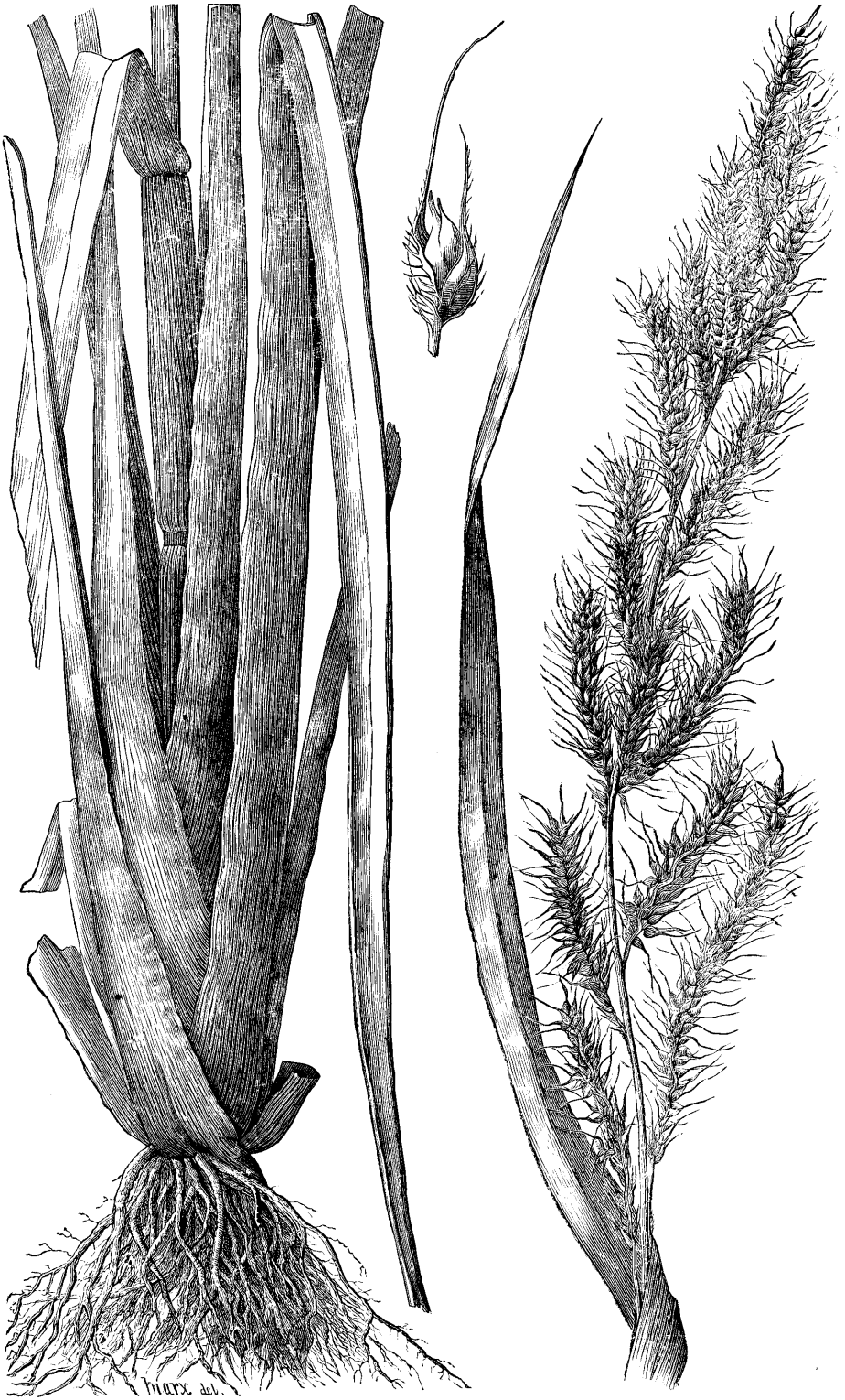


PHALARIS ARUNDINACEA, L. (*Reed Canary-Grass*).



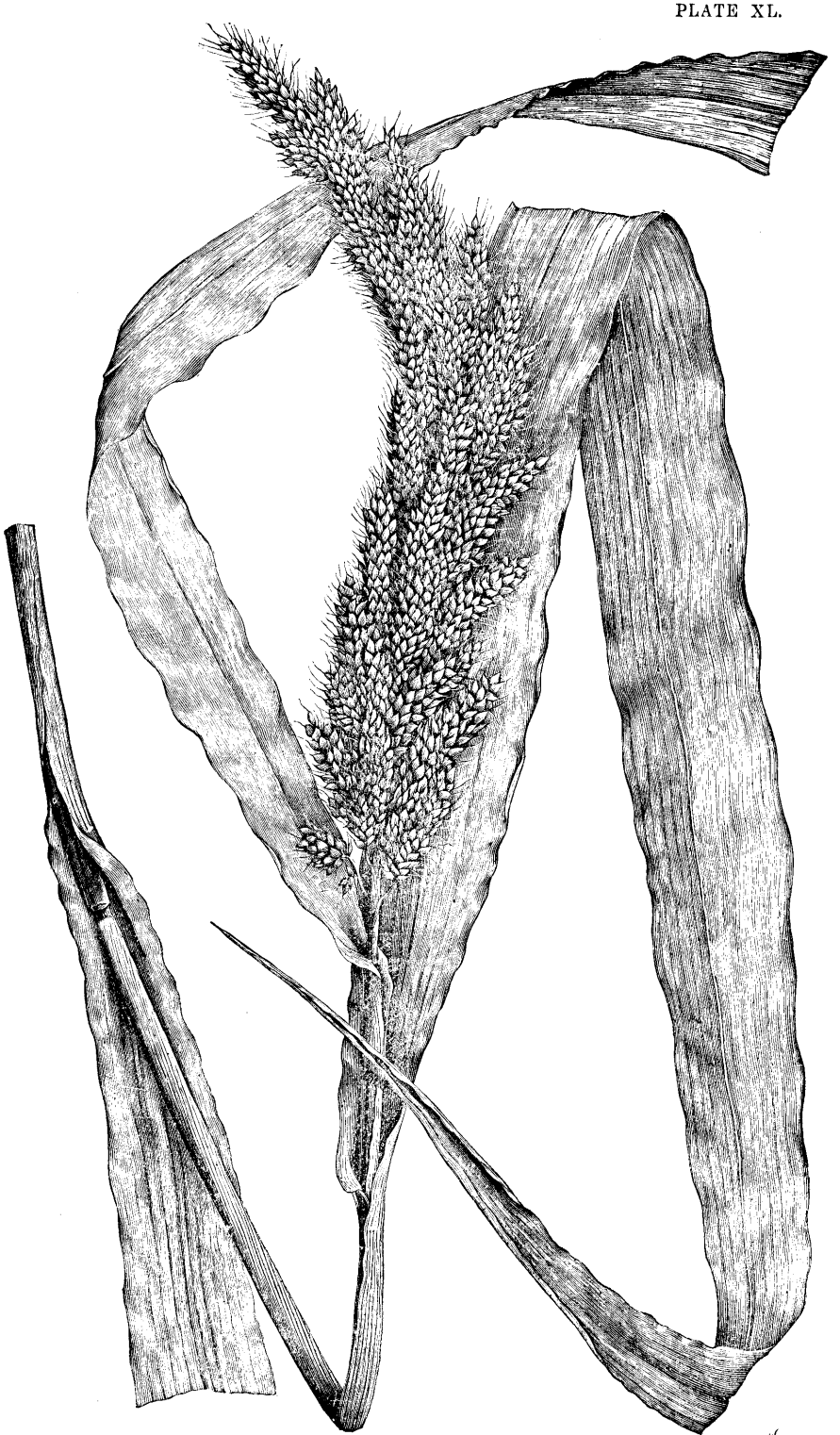
PANICUM CAPILLARE, L. (*Old-Witch Grass*).

PANICUM VIRGATUM, L. (*Tall Panic-Grass*).



PANICUM CRUS-GALLI, L. (*Barnyard Grass*).

SETARIA GLAUCA, Beauv. (*Foxtail*).



SETARIA ITALICA, Kunth. (*Hungarian Grass*).

ANDROPOGON FURCATUS, Muhl. (*Blue Stem*).

ANDROPOGON SCOPARIUS, Michx. (*Wood Grass*).

To the Secretary of the Maine Board of Agriculture:

I present herewith the Twelfth Annual Report of the transactions of the Maine State Pomological Society, being for the year ending December 31, 1884, but embracing the proceedings of the Winter Meeting, held, by adjournment, February 24th and 25th, 1885. With respect to the latter, which forms the larger and most valuable part of this report, it is proper to say that the theories and opinions expressed in the papers and discussions are to be regarded as the individual expressions of the writers and speakers, and the Society is only responsible for the accuracy and impartiality of the report.

G. B. SAWYER, *Secretary.*

Maine State Pomological Society.

OFFICERS FOR THE YEAR 1884.

President—CHARLES S. POPE, Manchester.

Vice Presidents—S. C. HARLOW, Bangor.
S. R. SWEETSER, Cumberland.

Secretary and Treasurer—GEO. B. SAWYER, Wiscasset.

Executive Committee—The President and Secretary, *ex-officio;* Andrew S. Sawyer, Cape Elizabeth; Leander H. Blossom, Turner; Frank E. Nowell, Fairfield.

Trustees—Androscoggin County, N. W. Harris, Auburn.

Aroostook	"	E. E. Parkhurst, Maysville Centre.
Cumberland	"	Francis C. Jordan, Brunswick.
Franklin	"	G. K. Staples, Temple.
Hancock	"	Charles G. Atkins, Bucksport.
Kennebec	"	Richard C. Plaisted, Gardiner.
Knox	"	Elmas Hoffses, Warren.
Lincoln	"	H. J. A. Simmons, Waldoboro'.
Oxford	"	Jairus K. Hammond, Paris.
Penobscot	"	J. E. Bennoch, Orono.
Piscataquis	"	Henry A. Robinson, Foxcroft.
Sagadahoc	"	Henry S. Cary, Topsham.
Somerset	"	James S. Hoxie, North Fairfield.
Waldo	"	D. B. Johnson, Freedom.
Washington	"	Nelson S. Allen, Dennysville.
York	"	Randall Boothby, Limerick.

COMMITTEES.

ON NEW FRUITS.

W. P. ATHERTON, Hallowell.
S. L. BOARDMAN, Augusta.

ON INTERNATIONAL EXHIBITION AT NEW ORLEANS.

S. L. BOARDMAN, Augusta.
RUFUS PRINCE, Turner.
CHARLES S. POPE, Manchester.

Officers for the Year 1885.

President—CHARLES S. POPE, Manchester.

Vice Presidents—S. R. SWEETSER, Cumberland Centre.
HENRY McLAUGHLIN, Bangor.

Secretary—GEO. B. SAWYER, Wiscasset.
[Resigned.]
SAMUEL L. BOARDMAN, Augusta.
[Appointed May 29, 1885.]

Treasurer—GEO. B. SAWYER, Wiscasset.

Executive Committee—The President and Secretary, *ex-officio*; Andrew S. Sawyer, Cape Elizabeth; Leander H. Blossom, Turner; William P. Atherton, Hallowell.

Trustees—

Androscoggin County,		D. J. Briggs, South Turner.
Aroostook	"	E. E. Parkhurst, Maysville.
Cumberland	"	Otis C. Nelson, New Gloucester.
Franklin	"	G. K. Staples, Temple.
Hancock	"	Charles G. Atkins, Bucksport.
Kennebec	"	Richard C. Plaisted, Gardiner.
Knox	"	Elmas Hoffses, Warren.
Lincoln	"	H. J. A. Simmons, Waldoboro'.
Oxford	"	Jairus K. Hammond, Paris.
Penobscot	"	J. E. Bennoch, Orono.
Piscataquis	"	H. A. Robinson, Foxcroft.
Sagadahoc	"	H. S. Cary, Topsham.
Somerset	"	James S. Hoxie, North Fairfield.
Waldo	"	D. B. Johnson, Freedom.
Washington	"	Nelson S. Allen, Dennysville.
York	"	Luther S. Moore, Limerick.

MEMBERS OF THE SOCIETY.

NOTE—Any errors or changes of residence should be promptly reported to the Secretary. Members will also confer a favor by furnishing the Secretary with their full Christian names where initials only are given.

LIFE MEMBERS.

Andrews, A. Emery ..... Gardiner
*Atherton, H. N ..... Hallowell
Atherton, W. P. ..... "
Atkins, Charles G ..... Bucksport
Atwood, Fred ..... Winterport
Bennoch, John E. ..... Orono
Briggs, D J ..... South Turner
Burr, John ..... Freeport
Carter, Otis L ..... Etna
Chase, Henry M ..... North Yarmouth
Chase, Martin V. B ..... Augusta
*Clark, Eliphalet ..... Portland
Crafts, Moses ..... Auburn
*Crosby, William C ..... Bangor
Dana, Woodbury S. ..... Portland
DeRocher, Peter ..... Waterville
Dirwanger, Joseph A ..... Portland
Dunham, W. W ..... North Paris
Dyer, Milton ..... Cape Elizabeth
*Emerson, Albert ..... Bangor
Farnsworth, B. B ..... Portland
Frost, Oscar F ..... Monmouth
Gardiner, Robert H ..... Gardiner
Gilbert, Z. A ..... North Greene
*Godfrey, John E. ..... Bangor
Hanscom, John ..... Saco
Harlow, S. C ..... Bangor
*Harris, N. C ..... Auburn
Harris, N. W ..... "
Harris, William M ..... "
Hersey, T. C ..... Portland
Hopkins, Miss S. M ..... Gardiner
Hoxie, James S ..... North Fairfield
Ingalls, Henry ..... Wiscasset
*Jewett, George ..... Portland
Johnson, Isaac A ..... Auburn
Jordan, Francis C ..... Brunswick
Low, Elijah ..... Bangor
Low, S. S ..... "
McLaughlin, Henry ..... "
*Metcalf, M. J ..... Monmouth
Moore, William G ..... "
Moor, F. A ..... Waterville
Morton, J. A ..... Bethel
Morton, William E ..... Portland
*Noyes, Albert ..... Bangor
Perley, Chas. I ..... Seward's (Vassalboro')
Pope, Charles S ..... Manchester
Pulsifer, D. W ..... Poland
*Richards, F. G ..... Gardiner
Richards, John T ..... "
*Richardson, J. M ..... "
Roak, George M ..... Auburn
Robinson, Henry A ..... Foxcroft
Rolfe, Samuel ..... Portland
Sawyer, Andrew S ..... Cape Elizabeth
Sawyer, George B ..... Wiscasset
Shaw, Stillman W ..... Minot
Simmons, H. J. A ..... Waldoboro'
*Smith, Alfred ..... Monmouth
Smith, Henry S ..... "
Starrett, L. F ..... Warren
*Stetson, Isaiah ..... Bangor
Stilphen, Asbury C ..... Gardiner
Stanley, Charles ..... Winthrop
Strout, S. F ..... West Falmouth
Strattard, Mrs. A. B ..... Monroe
Sweetser, S. R ..... Cumberland Centre
*Taylor, Joseph ..... Belgrade
Thomas, William W., Jr ..... Portland

* Deceased.

LIFE MEMBERS—Concluded.

Tilton, William S.....Chelsea
True, Davis P.....Leeds Center
Varney, James A.....Oregon
Vickery, James.....Portland
Vickery, John.....Auburn
Wade, Patrick.....Portland
*Weston, James C.....Bangor
Wharff, Charles S.....Gardiner
Whitney, Edward K.....Harrison
Woodman, George W.....Portland

* Deceased.

ANNUAL MEMBERS—1884.

Allen, B. E.....North Greene
Baker, John C.....Lewiston
Blossom, Leander H.....Turner Centre
Blossom, G. W.....Turner
Boardman, Samuel L.....Augusta
Carpenter, James M.....Pittston
Cary, Henry S.....Topsham
Chipman, A. B.....West Gloucester
Dunton, John.....Lewiston
Emerson, Ivory W.....“
Fulton, James M.....Bowdoinham
George, Charles H.....Hebron
Gilman, Charles J.....Brunswick
Hammond, Jairus K.....Paris
Ham, Nelson.....Lewiston
Hoffses, Elmas.....Warren
Johnson, Henry.....Turner
Jordan, Alice M., Miss.....Auburn
Kenniston, E. H.....Simpson's Corner
Ladd, John.....Starks
Lapham, E. A.....Pittston
Leach, H. T.....East Monmouth
Litchfield, L. K.....Winthrop
Merrill, T. M.....West Gloucester
Mitchell, Israel.....Lewiston
Nelson, O. C.....Upper Gloucester
Nowell, Frank E.....Fairfield
Peacock, J. R.....Gardiner
Perkins, L. J.....Deering
Pierce, Mrs. A. C.....Lewiston
Powers, L. R.....Georgetown
Prince, Rufus.....South Turner
Staples, G. K.....Temple
Towle, J. J.....Dixfield
Wakefield, Isaiah.....Greene
Wharff, William R.....Gardiner
Whitmore, Thomas P.....Bowdoinham

Maine State Pomological Society.

TRANSACTIONS FOR 1884.

The general outline of the Society's proceedings in the year 1884 was much like that of former years. The annual exhibition was held at Lewiston, September 23d to 26th, inclusive, in connection with the fair of the State Agricultural Society. The annual meeting was convened at the City Building, in Lewiston, September 25th, pursuant to notice given, but was adjourned to the time and place of the Winter Meeting.

The Winter Meeting was held at Gardiner, February 24th and 25th, 1885, independently of any other organization.

The fruit crop of 1884 was undoubtedly the largest ever grown in the State. The season was exceptionally favorable. Notwithstanding the immense production, the crop was a profitable one. There was a steady demand for standard varieties of winter apples for shipment, at remunerative prices. But the autumn apples and miscellaneous kinds of winter fruit were in excess of the demand. The great lesson of the past year is that the profits of the business of orcharding lie in the cultivation of but few varieties, and those such as are known and approved in the markets—well grown, carefully handled and faithfully packed.

THE ANNUAL EXHIBITION

embraced the different classes of fruit, flowers, and some miscellaneous articles, substantially as in former years, and as will more fully appear by the list of premiums offered and awarded. The number of entries was 1183, being a little above the average. The premiums awarded amounted to $634.00, all of which has been paid. All the classes of fruit were well represented in the entries, the apples being far in excess of all the others combined. The

great abundance and excellent quality of the apple crop of the year, a marked improvement in the art and methods of exhibition, and increased care in the selection of specimens, made the display of apples both attractive and instructive. For the first time, a complete classification was effected of the varieties exhibited as single dishes, and these were marked by placards bearing the names of the varieties in conspicuous letters.

The general collections of apples were so extensive as to be actually burdensome, embracing about 2500 plates. It seems to be necessary that hereafter these collections should be limited to some reasonable number of varieties. In the earlier exhibitions of the Society it was thought necessary to encourage these extensive collections *for the sake of the show;* but now the reverse is true, and they must be restricted in order to bring the exhibition within the limits of the space allotted. The Society has long ago set the seal of its disapproval on the indiscriminate multiplication of varieties, and for this reason, also, the privilege of exhibition should be limited. A person may raise, as a matter of study and experiment, as many varieties as he can find room for, or time and patience to provide labels and receptacles for, but his study and experimenting will have been of little avail if he cannot select twenty or thirty kinds better than all the rest.

GENERAL RULES OF THE EXHIBITION.

1. The general regulations of the Joint Exhibition will govern this department, as far as applicable thereto, and except as herein otherwise provided.

2. Entries may be made at the office of the Secretary, in Wiscasset, personally or by letter, until September 19th, and after that at the Park, on the first day of the exhibition, until 4 o'clock P. M.

3. Exhibitors are requested to present full and accurate lists of the varieties of fruit or other articles to be entered; and to specify the premium for which each article is entered; also to affix their names and P. O. addresses, so that the same may be correctly transferred to the books and exhibition cards.

☞ Persons intending to make entries will confer a special favor by sending lists of the same to the Secretary at an early day.

4. All fruits and flowers offered for premiums must have been grown by the exhibitor; and any violation of this rule will debar or forfeit the premium. Specimens offered for *exhibition only*, by others

than the growers, must in all cases have the name of the grower affixed, if known.

5. All fruits and flowers exhibited must, as far as possible, be correctly named according to the standard nomenclature adopted by the Society, and it will be the duty of the standing committee of the Society to examine labels and correct all errors in nomenclature during the exhibition.

6. Where a certain number of specimens or varieties, or a definite quantity of any article, is required by the schedule, exhibitors should conform to such requirement; and larger quantities will not be admitted except by special arrangement with the Executive Committee, having reference to economy of space and the symmetry of the exhibition.

7. Dishes and labels for the exhibition of fruits, and phials and stands for cut flowers, will be furnished by the Society, and no others will be admissible. No premium will be paid on any article which is accompanied by an advertisement or business card.

8. Exhibitors must see to the delivery of their contributions, and will be required to put them *in the places designated for them.* After the articles are arranged they will be under the exclusive charge of the Society, and the owners will not have liberty to remove them until the exhibition is closed. All reasonable precautions will be taken for the safe keeping of articles on exhibition, after their arrival and arrangement upon the tables; but the Society will not be responsible for any loss or damage that may occur.

9. No premium will be awarded merely for want of competition, nor unless the article exhibited is worthy of it; and the committees are authorized to withhold the first and award the second or any subsequent premium, or none, at their discretion, according to merit. They are also to withhold all premiums from any articles not exhibited according to the rules, or where any unfair practice has been attempted by the exhibitor.

10. The committees are authorized to recommend gratuities for any new or rare fruits, flowers, plants, or articles of merit for which no premiums have been offered.

11. When a specimen is presented for identification, the exhibitor shall communicate all the information he possesses as to the origin and the local appellation.

12. No member of any of the committees for awarding premiums shall, in any case, vote or decide respecting an award for which such

member may be a competitor, or therein have an interest; but in such case such member shall temporarily vacate his place upon the committee.

13. All premiums awarded will be payable by the Treasurer in sixty days after the close of the exhibition, *subject, however, to the following conditions and limitations*, viz:

1st—The Society guarantees to pay premiums and gratuities to the amount of $500, but reserves the right, if more than that amount is awarded, to make such a *pro rata* reduction as will reduce the whole amount payable to that sum.

2d—All premiums not applied for before the first day of January next shall revert to the Society.

3d—The Society's premiums are open for competition to all persons residing in the State; but when premiums and gratuities exceeding $1.00 and less than $20.00 are awarded to a person not a member of the Society, the fee for membership will be deducted therefrom; and when premiums and gratuities amounting to $20.00 or more are awarded to any person not a life member of the Society, the fee for life membership will be deducted therefrom; and in either case certificates of membership will be issued accordingly.

LIST OF PREMIUMS OFFERED AND AWARDED.

Class 1—APPLES.

FIRST DIVISION.

Special Regulations. "Entries for all premiums in this division must consist of five specimens of each variety exhibited, and (except Nos. 18 and 19) of at least twenty correctly named varieties. Entries for premiums Nos. 18 and 19 must be separate and distinct collections, not embracing any other collection or specimens, and in awarding the premiums regard will be had both to the quality of the specimens and the value of the varieties exhibited.

"By 'named varieties' is meant such as are named and described in some standard work on Pomology, or have been named and approved by some National or State Horticultural Society.

"In adopting 20 as the number of varieties required in these collections (1 to 17), the Society does not intend to encourage the multiplication of varieties; and the committee will be instructed, in awarding the premiums, to have regard to *quality* and *value* rather than to the number of varieties, and will be authorized to recommend gratuities for meritorious collections embracing less than the number of varieties required as above."

Collections entered in this division for the county premiums were allowed to be entered for the general competition under premium No. 1; but it was provided that no more than one premium should be awarded to any collection.

The number of entries in this division was 105, and the amount of premiums awarded was $257.50, as follows:

Premium No. 1. For the best general exhibition of apples grown by the exhibitor in any part of the State. Miss L. L. Taylor, Lakeside (Belgrade), first premium, $15; Perley & Perkins, Seward's (Vassalboro'), second premium, $10; John Dunton, Lewiston, third premium, $5.

2. For the best general exhibition of apples grown by the exhibitor, in Androscoggin County. L. H. Blossom, Turner Centre, $10; D. J. Briggs, South Turner, $8; G. W. Blossom, Turner, $5.

3. For the same in Aroostook County. No entry.

4. For the same in Cumberland County. S. R. Sweetser, Cumberland Centre, $10; Milton Dyer, Cape Elizabeth, $8; T. M. Merrill, West Gloucester, $5.

5. For the same in Franklin County. G. K. Staples, Temple, $10. [2d and 3d not awarded].

6. For the same in Hancock County. No entry.

7. For the same in Kennebec County. J. Pope & Son, Manchester, $10; E. A. Lapham, Pittston, $8; W. R. Wharff, Gardiner, $5.

8. For the same in Knox County. Elmas Hoffses, Warren, $10. [2d and 3d not awarded.]

9. For same in Lincoln County. H. J. A. Simmons, Waldoboro', $10; Henry Ingalls, Wiscasset, $8; G. B. Sawyer, Wiscasset, $5.

10. For the same in Oxford County. J. J. Towle, Dixfield, $10; C. H. George, Hebron, $8.

11. For the same in Penobscot County. J. E. Bennoch, Orono, $10; E. H. Kenniston, Dixmont, $8.

12. For the same in Piscataquis County. No entry.

13. For the same in Sagadahoc County. James M. Fulton, Bowdoinham, $10; Henry S. Carey, Topsham, $8; L. R. Powers, Georgetown, $5.

14. For the same in Somerset County. James S. Hoxie, North Fairfield, $10; Frank E. Nowell, Fairfield, $8; John Ladd, Starks, $5.

15. For the same in Waldo County. Mrs. A. B. Strattard, Monroe, $10. [2d and 3d not awarded.]

16. For the same in Washington County. No entry.

17. For the same in York County. No entry.

18. For the best five named varieties of Autumn apples. H. J. A. Simmons, $3; S. R. Sweetser, $2; Miss L. L. Taylor, $1.

19. For the best five named varieties of Winter apples. S. R. Sweetser, $3; L. H. Blossom, $2; Nelson Ham, Lewiston, $1.

20. For the best collection of apples for home use, for the entire year, in the smallest number of varieties. H. J. A. Simmons, $5; S. R. Sweetser, $3; S. W. Shaw, Minot, $2.

21. For the best collection of Crab apples. J. S. Hoxie, $1; Isaiah Wakefield, Greene, 50c.

SECOND DIVISION.

"Entries for premiums in this division must consist of from five to ten specimens, according to size, of each variety exhibited, and must be separate specimens from any exhibited in the first division."

Number of entries, 622; amount awarded, $82.75.

22. For the best single variety of Autumn apples. S. R. Sweetser, $2; H. J. A. Simmons, $1.

23. For the best single variety of Winter apples. S. R. Sweetser, $2; H. J. A. Simmons, $1.

24. For the best dish of Alexander. John Dunton, $1; Miss L. L. Taylor, 50c.

25. American Golden Russet (*Syn. Sheepnose*). Henry Ingalls, $1. [2d not awarded].

26. Baldwins. A. E. Andrews, Gardiner, $1; John Dunton, 50c.

27. Benoni. F. E. Nowell, $1; S. R. Sweetser, 50c.

28. Black Oxford. L. H. Blossom, $1; G. W. Blossom, 50c.

29. Blue Pearmain. L. L. Taylor, $1; Perley & Perkins, 50c.

30. Briggs' Auburn. I. T. Waterman, East Auburn, $1; L. L. Taylor, 50c.

31. Cole's Quince. J. E. Bennoch, $1; H. S. Briggs, North Auburn, 50c.

32. Danvers' Sweet. Mrs. M. L. Robbins, Winthrop, $1; G. B. Sawyer, 50c.

33. Dean. J. S. Hoxie, $1; Miss L. L. Taylor, 50c.

34. Duchess of Oldenburg. S. R. Sweetser, $1; John Dunton, 50c.

35. Early Harvest. H. J. A. Simmons, $1; F. E. Nowell, 50c.

36. Early Strawberry. Moses Crafts, Auburn, $1; Henry Ingalls, 50c.

37. Fall Harvey. J. J. Towle, $1; L. L. Taylor, 50c.

38. Fall Pippin. E. A. Lapham, $1; S. W. Shaw, 50c.

39. Fameuse. C. H. George, $1; S. W. Shaw, 50c.

40. Franklin Sweet. L. L. Taylor, $1; G. W. Blossom, 50c.

41. Garden Royal. J. J. Towle, $1; Perley & Perkins, 50c.

42. Gravenstein. G. W. Blossom, $1; T. M. Merrill, 50c.

43. Hightop Sweet. J. S. Hoxie, $1; H. S. Carey, 50c.

44. Hubbardston Nonsuch. E. A. Lapham, $1; Mrs. M. L. Robbins, 50c.

45. Hunt Russet. H. J. A. Simmons, $1; Elmas Hoffses, 50c.

46. Jewett's Red. S. R. Sweetser, $1; Oscar F. Frost, Monmouth, 50c.

47. King of Tompkins County. Isaiah Wakefield, $1; John Dunton, 50c.

48. King Sweeting. L. L. Taylor, $1; J. S. Hoxie, 50c.

49. Large Yellow Bough. S. W. Shaw, $1; S. R. Sweetser, 50c.

50. Minister. G. W. Blossom, $1; Elmas Hoffses, 50c.

51. Moses Wood. W. R. Wharff, $1; Perley & Perkins, 50c.

52. Mother. L. L. Taylor, $1; S. R. Sweetser, 50c.

53. Northern Spy. J. R. Peacock, Gardiner, $1; W. H. Young, Auburn, 50c.

54. Orange Sweet. J. S. Hoxie, $1; L. K. Litchfield, Winthrop, 50c.

55. Peck's Pleasant. A. E. Andrews, $1; J. S. Hoxie, 50c.

56. Pomme Royale. J. Pope & Son, $1.

57. Porter. S. W. Shaw, $1; S. R. Sweetser, 50c.

58. President. L. H. Blossom, $1; B. E. Allen, North Greene, 50c.

59. Primate. L. R. Powers, $1; H. J. A. Simmons, 50c.

60. Pumpkin Sweet. H. S. Carey, $1; G. W. Blossom, 50c.

61. Red Astrachan. H. J. A. Simmons, $1; Mrs. A. B. Strattard, 50c.

62. Red Canada. Nelson Ham, $1; Perley & Perkins, 50c.

63. Red Russet. S. R. Sweetser, $1; Mrs. M. L. Robbins, 50c.

64. Rhode Island Greening. Perley & Perkins, $1; C. H. George, 50c.

65. Rolfe. B. E. Allen, $1.

66. Roxbury Russet. S. R. Sweetser, $1; J. D. Briggs, 50c.

67. Sops of Wine. L. H. Blossom, $1; H. J. A. Simmons, 50c.

68. Somerset. L. L. Taylor, $1; S. R. Sweetser, 50c.

69. Starkey. G. B. Sawyer, $1; Perley & Perkins, 50c.

70. Talman's Sweet. D. J. Briggs, $1; M. S. Sylvester, Leeds, 50c.

71. Tetofsky. Milton Dyer, $1.

72. Wagener. N. W. Harris, Auburn, $1; Charles Foss, Turner Centre, 50c.

73. Williams' Favorite. Miss L. L. Taylor, $1; H. J. A. Simmons, 50c.

74. Winthrop Greening. E. A. Lapham, $1; F. E. Nowell, 50c.

75. Yellow Bellflower. R. H. Gardiner, Gardiner, $1; Ivory W. Emerson, Lewiston, 50c.

76. Crab Apples. H. J. A. Simmons, 50c; Nelson Ham, 25c.

Class 2—PEARS.

Number of entries, 155; amount awarded, $74.25.

"Entries for premiums Nos. 77, 78 and 79 must consist of five specimens of each variety exhibited."

77. For best general exhibition of pears. Samuel Rolfe, Portland, $12; L. J. Perkins, Deering, $8; D. P. True, Leeds Centre, $5; J. E. Bennoch, $3.

78. For best five named varieties of Autumn pears. D. P. True, $3.

79. For best five named varieties of Winter pears. No entry.

"Entries for premiums Nos. 80 to 109, inclusive, must consist of five to ten specimens, according to size, of each variety exhibited."

80. For best single variety of Autumn pears. H. T. Leech, Monmouth, $2; L. K. Litchfield, $1.

81. For the best single variety of Winter pears. D. P. True, $2; L. K. Litchfield, $1.

82. For the best dish of Bartlett. J. C. Symmes, Auburn, $1; H. T. Leech, 50c.

83. Belle Lucrative. G. W. Blossom, $1; S. W. Shaw, 50c.

84. Beurre d' Anjou. Israel Mitchell, Lewiston, $1; Henry Ingalls, *Gratuity*, 75c.; S. W. Shaw, 50c.

85. Beurre Bosc. Henry Ingalls, $1; J. E. Bennoch, 50c.

86. Beurre Hardy. R. H. Gardiner, $1.

87. Beurre Superfin. D. P. True, $1; Henry Ingalls, 50c.

88. Beurre Clairgeau. D. J. Briggs, $1; G. B. Sawyer, 50c.

89. Beurre Diel. Ivory W. Emerson, $1; D. J. Briggs, 50c.

90. Buffum. D. P. True, $1; Nelson Ham, 50c.

91. Clapp's Favorite. L. R. Powers, $1; H. T. Leech, 50c.

92. Doyenne Boussock. Henry Ingalls, $1.

93. Duchess d' Angouleme. A. B. Chipman, West Gloucester, $1; D. P. True, 50c.

94. Eastern Belle. Henry McLaughlin, Bangor, $1.

95. Flemish Beauty. L. K. Litchfield, $1; L. L. Taylor, 50c.

96. Fulton. Wesley Patten, Bowdoinham, $1.

97. Glout Morceau. D. J. Briggs, $1; L. K. Litchfield, 50c.

98. Goodale. Henry Ingalls, $1; Perley & Perkins, 50c.

99. Howell. Israel Mitchell, $1; Henry Ingalls, 50c.

100. Lawrence. C. H. George, $1; S. W. Shaw, 50c.

101. Louise Bonne de Jersey. D. P. True, $1; Israel Mitchell, 50c.

102. Maria Louise. No entry.

103. Nickerson. Perley & Perkins, $1.

104. Seckel. S. W. Shaw, $1; D. J. Briggs, 50c.

105. Sheldon. Miss L. L. Taylor, $1; Ivory W. Emerson, 50c.

106. Swan's Orange. J. E. Bennoch, $1.

107. Urbaniste. Henry Ingalls, 50c.

108. Vicar of Winkfield. A. B. Chipman, $1; D. P. True, 50c.

109. Winter Nelis. G. W. Blossom, $1; Henry Ingalls, 50c.

Class 3—GRAPES.

Number of entries, 66; amount awarded, $55.50.

110. For best exhibition of grapes grown with artificial heat. John C. Baker, Lewiston, $8; John Vickery, Auburn, $5.

111. For best exhibition of grapes grown in cold grapery. G. B. Sawyer, $8.

112. For best cluster Black Hamburgh, Wilmot's Hamburgh or Victoria Hamburgh, John C. Baker, $1; John Vickery, 50c.

113. White Frontignan. No entry.

114. Grizzly " "

115. White Muscat. J. C. Baker, $1.

116. Muscat Hamburgh. Not awarded.

117. White Chasselas. G. B. Sawyer, $1; John Vickery, 50c.

118. Lady Downes. No entry.

119. Buchland Sweet-Water. G. B. Sawyer, $1; J. C. Baker, 50c.

120. Trentham Black. No entry.

121. West's St. Peters. No entry.

122. White Nice. J. C. Baker, $1.

123. Red Chasselas. G. B. Sawyer, $1.

124. Chasselas Musque. G. B. Sawyer, $1; J. C. Baker, 50c.

125. For the best exhibition of grapes grown in open air. J. S. Hoxie, $5; Perley & Perkins, $3; D. P. True, $2.

126. Best single variety (open air). Perley & Perkins, $2. J. S. Hoxie, $1.

127. Best three bunches Delaware. G. B. Sawyer, $1; Wesley Blanchard, Lewiston, 50c.

128. Concord. Wesley Blanchard, $1; Perley & Perkins, 50c.

129. Hartford Prolific. Wesley Blanchard, $1; Perley & Perkins, 50c.

130. Rebecca. No entry.

131. Allen's Hybrid. J. S. Hoxie, $1; G. B. Sawyer, 50c.

132. Adirondac. No entry.

133. Creveling. Perley & Perkins, 50c.

134. Massasoit. J. S. Hoxie, $1; S. W. Shaw, 50c.

135. Wilder. No entry.

136. Lindley. J. S. Hoxie, $1.

137. Agawam. No entry.

138. Merrimac. No entry.

139. Salem. Wesley Blanchard, $1; J. S. Hoxie, 50c.

140. Worden. Perley & Perkins, $1.

141. Brighton. No entry.

142. Pocklington. No entry.

143. Moore's Early. J. S. Hoxie, $1.

Class 4—PLUMS.

Number of entries, 26; amount awarded, $11.

144. For the best general exhibition of plums, not less than ten varieties. No entry.

"Entries for premiums Nos. 145 to 164, inclusive, must consist of not less than twelve specimens each."

145. For best dish of plums of a single variety. Nelson Ham, $2; D. P. True, $1.

146. For best dish Green Gage. L. R. Powers, $1.

147. Purple Gage. J. S. Hoxie, $1.

148. Red Gage. No entry.

149. Yellow Gage. J. S. Hoxie, $1.

150. Prince Imperial Gage. H. J. A. Simmons, $1.

151. Coe's Golden Drop. No entry.

152. General Hand. No entry.

153. Yellow Egg. No entry.

154. Lawrence. No entry.

155. Moore's Arctic. No entry.

156. McLaughlin. No entry.

157. Bavay's Green Gage. Nelson Ham, $1.

158. Lombard. Thomas H. Longley, Lewiston, $1; Moses Crafts, Auburn, 50c.

159. Columbia. No entry.

160. Magnum Bonum. No entry.

161. Washington. No entry.

162. Jefferson. No entry.

163. Penobscot. J. S. Hoxie, $1.

164. Smith's Orleans. No entry.

Gratuity. Duane's Purple. Mrs. G. W. Bean, Lewiston, 50c.

Class 5—MISCELLANEOUS.

Number of entries, 97; amount awarded, $37.50.

165. For best dish of peaches. No entry.

166. " " apricots. "

167. " " nectarines. "

168. " " quinces. "

169. " peck cultivated cranberries. Henry Johnson, Turner, $2.

170. Samples of nursery apple trees. Not awarded.

171. " " pear trees. No entry.

172. " " grape vines. No entry.

173. Best orange tree, in fruit. No entry.

174. " lemon " " "

175. " fig " " "

176. " variety of canned fruits, preserves, pickles, etc., put up and made by the exhibitor. Miss Alice M. Jordan, Auburn, $3; Mrs. A. C. Pierce, Lewiston, $2.

177. Best specimen of canned peaches. Mrs. A. C. Pierce, $1; Alice M. Jordan, 50c.

178. Best specimen of canned plums. Mrs. D. P. True, Leeds Centre, $1; Mrs. A. C. Pierce, 50c.

179. Best specimen of canned strawberries. Mrs. D. P. True, $1; Mrs. A. C. Pierce, 50c.

180. Best specimen of canned raspberries. Mrs. A. C. Pierce, $1; A. B. Chipman, 50c.

181. Best specimen of canned cherries. Mrs. D. P. True, $1; Mrs. A. C. Pierce, 50c.

182. Best specimen of canned quinces. No entry.

183. " " " tomatoes. Mrs. A. C. Pierce, $1; A. B. Chipman, 50c.

184. Best specimen of preserved quinces. Alice M. Jordan, 50c.

185. " " " apples. Alice M. Jordan, $1; Miss Addie L. Lapham, Pittston, 50c.

186. Best specimen of preserved plums. Mrs. D. P. True, $1.

187. " " " pears. Alice M. Jordan, $1; Mrs. A. C. Pierce, 50c.

188. Best specimen of preserved strawberries. A. B. Chipman, $1; Alice M. Jordan, 50c.

189. Best specimen of preserved raspberries. Mrs. A. C. Pierce, $1; Alice M. Jordan, 50c.

190. Best specimen of preserved currants. Alice M. Jordan, $1; A. B. Chipman, 50c.

191. Best specimen of preserved cherries. A. B. Chipman, $1; Mrs. D. P. True, 50c.

192. Best jar assorted pickles. Mrs. E. A. Lapham, Pittston, $1; Mrs. A. B. Strattard, 50c.

193. Best bottle tomato catsup. Mrs. E. A. Lapham, $1; Alice M. Jordan, 50c.

194. Best bottle mushroom catsup. No entry.

195. " jar quince jelly. Alice M. Jordan, $1.

196. " " apple jelly. Mrs. A. C. Pierce, $1; A. B. Chipman, 50c.

197. Best jar grape jelly. Mrs. R. M. Jordan, Auburn, $1; Alice M. Jordan, 50c.

198. Best jar currant jelly. Mrs. A. C. Pierce, $1; A. B. Chipman, 50c.

199. Best jar strawberry jelly. Alice M. Jordan, 50c.

200. Best 5 lbs. evaporated apples. J. J. Towle, $1.

201. " fruit evaporator, in operation. No entry.

Gratuity. For jar of maple syrup. Geo. W. Manter, Oakland, $1.

Mr. J. C. Symmes, of Auburn, exhibited very fine specimens of canned blackberries, corn, beans, tomatoes, squash and pumpkin, which received the unqualified commendation of the committee.

Class 6—FLOWERS.

"In this class no article can be entered for more that one premium. All plants and flowers entered for premium must be in their places at the exhibition room on the first day of the fair."

FIRST DIVISION.

Number of entries, 33; amount awarded, $49.50.

202. For best display of cut flowers, filling not less than 100 phials. Mrs. G. B. Sawyer, Wiscasset, $10; Mrs. Charles Stanley, Winthrop, $8; Mrs. A. B. Strattard, Monroe, $5.

203. For best exhibition of roses, not less than five varieties. W. E. Morton & Co., Portland, $5.

204. Dahlias, not less than ten varieties. Mrs. Charles Stanley, $2; Miss Cora E. Ring, Richmond, $1.

405. Chinese Pinks. W. E. Morton & Co., 50c.

406. Carnations, not less than five varieties. W. E. Morton & Co., $2; Mrs. A. B. Strattard, $1.

207. Japan Lilies. W. E. Morton, $2.

208. Asters, not less than ten varieties. Cora E. Ring, $1; Mrs. G. B. Sawyer, 50c.

209. Pansies. Mrs. A. B. Strattard, $1; Miss L. M. Pope, Manchester, 50c.

210. Zinnias. W. E. Morton & Co., $1.

211. Phlox Drummondii. Miss Ida M. Litchfield, Winthrop, $1; Mrs. A. B. Strattard, 50c.

212. Stocks. No entry.

213. Balsams. No entry.

214. Chrysanthemums. No entry.

215. Petunias. W. E. Morton & Co., $1; Mrs. Charles Stanley, 50c.

216. Gladiolus. Miss L. M. Pope, $2; Geo. M. Roak, Auburn, $1.

217. Verbenas. Miss L. M. Pope, $2; Geo. M. Roak, $1.

SECOND DIVISION.

Number of entries, 26; amount awarded, $31.25.

218. For best pair of parlor bouquets. Mrs. C. Stanley, 50c.

219. Pair wall bouquets. No entry.

220. " hand bouquets. Mrs. C. Stanley, 50c.

221. Floral pillow. W. E. Morton & Co., $5.

222. " design. W. E. Morton & Co., $5; Mrs. C. Stanley, $3; Geo. M. Roak, $2.

223. Floral wreath. W. E. Morton & Co., $2; John Burr, Freeport, $1.

224. Dinner table decoration. Miss L. M. Pope, $2; W. E. Morton & Co., $1.

225. Basket wild flowers. Miss Edith M. Leavitt, Auburn, $1; Miss Alice M. Jordan, 50c.

226. Dried grasses. Mrs. C. Stanley, $2.

227. Everlasting flowers. Mrs. A. B. Strattard, $1.

228. Dish cut flowers. Miss I. M. Litchfield, $1.

229. Fancy basket of flowers. W. E. Morton & Co., $2; G. M. Roak, $1; John Burr, 75c.

THIRD DIVISION.

Number of entries, 28; amount awarded, $34.75.

230. For best exhibition of greenhouse plants. G. M. Roak, $8; John Burr, $5.

231. For best exhibition of pot plants, not less than 20 pots. No entry.

"Persons exhibiting greenhouse plants (No. 230), cannot compete for premium No. 231."

232. For best exhibition of ferns. G. M. Roak, $3; John Burr, $2.

233. Geraniums. G. M. Roak, $2; John Burr, 1.

234. Begonias. G. M. Roak, $2; John Burr, $1.

235. Coleus. John Burr, $2; G. M. Roak, $1.

236. Best specimen plant of Tuberose. G. M. Roak, 50c.; John Burr, 25c.

237. Best specimen plant of Dracæna. John Burr, 50c.; G. M. Roak, 25c.

238. Best specimen plant of Double Geranium. G. M. Roak, 50c.; Miss E. M. Leavitt, 25c.

239. Best specimen plant of Single Geranium. No entry.

240. " " Salvia Splendens. G. M. Roak, 50c.; John Burr, 25c.

241. Best specimen plant of Foliage Begonia. John Burr, 50c.; G. M. Roak, 25c.

242. Best specimen plant of Flowering Begonia. John Burr, 50c.; G. M. Roak, 25c.

243. Best specimen plant of Coleus. G. M. Roak, 50c.; John Burr, 25c.

244. Best specimen plant of Fuchsia. G. M. Roak, 50c.

245. " " Carnation. G. M. Roak, 50c.

246. For best single pot plant. Miss Lou Maxwell, Lewiston, $1; G. M. Roak, 50c.

247. Best hanging basket with plants. No entry.

248. Best climbing plant, on trellis. No entry.

249. Wardian case. No entry.

250. Rustic stand, not less than three feet in height, filled with choice plants. No entry.

Proceedings of the Winter Meeting.

The annual Winter Meeting of the Maine State Pomological Society was held at Gardiner, in the new Library Hall, on the 24th and 25th days of February, 1885. Two sessions were held on the first day (afternoon and evening), the forenoon having been spent in arranging the exhibition of fruit; and three sessions on the second day.

The exhibition was satisfactory in respect to the number of entries and of varieties exhibited, and especially gratifying on account of the uniform excellence of the specimens. Further particulars in regard to it will be found in the report of the committee at a later stage of the proceedings.

FIRST DAY—Afternoon Session.

The Society met at two o'clock in the afternoon, and was called to order by the President. O. B. Clason, Esq., of Gardiner, in a brief address, welcomed the Society to the city, and was replied to in behalf of the Society by the Secretary, and the President delivered his annual address.

ADDRESS OF WELCOME.

By O. B. Clason, Esq., of Gardiner.

Mr. President, and Members of the Maine State Pomological Society:—The absence of our Mayor from the State affords me the pleasure of welcoming you to this city, named in honor of the father of one of the recent presidents of this Society. Several of your most active members are among our prominent citizens, and the fact that they are so closely identified with this exhibition here to-day is a sufficient guaranty of the usefulness and practicability of this Society in advancing the fruit-growing interests of our State. The soil of the Kennebec valley is fertile and well adapted to fruit culture; yet, ride in any direction from this city but a few miles and you will find instances of orchards allowed to go to decay, with

scarcely an effort being made to keep them in bearing condition. Why is this? Is it because orcharding does not pay? Probably it does not to them. What is the answer? It occurs to me that it is because of ignorance or carelessness of the farmer, perhaps in the selection of varieties adapted to the soil, but more especially in bestowing upon the orchards proper care. The trees of the forest grow, and why should not the trees of the orchard? they may reason. Pruning and mulching are rarely resorted to; the result is fruit inferior in quality and quantity, and ill-shapen trees. This ignorance, if you choose so to call it, can only be remedied by educating the farmer in the practical methods of caring for his orchards. This cannot be done by theoretical treatises, for they will not be read, much less practiced; but it can be accomplished by just such exhibitions as you have here today; by seeing the fine display of fruit upon these tables; by conversing with the active members of this Society, and especially by listening to the good, practical, common sense essays, that, I doubt not, will be read before this meeting. I hope means will be provided to enable the history of your proceedings to be scattered all over our State, that all interested in fruit culture may have the benefit of your wisdom.

Again, Mr. President, for what your Society has done in the past, for what it is now doing, and for what it proposes to do, I cordially welcome you to this city, and hope your stay will be pleasant and profitable.

The SECRETARY responded as follows:

Having been designated by the President to reply, in behalf of this Society, to the cordial welcome which has been extended to it by the gentleman who has addressed us in behalf of the government and citizens of Gardiner, allow me to say that in accepting the invitation the Society feels itself not only highly honored by the complimentary terms in which it is expressed, but grateful, also, for so kindly a reception as we have met. We are not strangers to the people of Gardiner; we remember that a little more than four years ago, we held in this city one of our most successful annual exhibitions; and that on another occasion, we held here a winter meeting, similar to this, which was highly satisfactory in its character and results. The pleasant recollections of these two occasions linger in our memories; the goodly number of citizens who are or have been members of the Society affords another bond of sympathy, and we come back to this busy and beautiful city almost with a feeling

that it is our home. It is not necessary, therefore, that I should say much at this time in regard to our Society and its general purposes.

We meet here again, as we have done before, to exhibit the productions of our orchards and gardens (so far as we can at this season of the year), to talk over our experiences, to see what we can learn from each other,—what lessons of practical wisdom in fruit culture can be drawn from the results of the operations of the year, and to do what we can, by this public meeting and the publication of its proceedings, to advance the material interests of our State.

There is a special propriety in the selection of this city as the place of our meeting. Its people are hospitable, its facilities ample, and its location favorable; but still more so because it is the centre of a community in which the special interest represented by this Society has long been prominent. It is remembered by some of us that there was held in this city, about thirty years ago, the first State horticultural exhibition in Maine, by a Society organized in this county, but embracing the whole State, and with objects similar to those of this Society; and that in this immediate vicinity, favored in soil, situation and climate, fruit culture has, from the earliest period of its history, ranked among the foremost employments of an intelligent and prosperous population.

Again thanking the citizens of Gardiner for their kindly welcome, we invite them to participate with us in the deliberations of our meeting, and hope the occasion may be mutually beneficial.

OPENING ADDRESS OF THE PRESIDENT,

CHARLES S. POPE, of Manchester.

Ladies and Gentlemen: The few remarks which I have to make at this time will be mostly in the form of suggestions or queries.

It seems fitting at the close of the year to take a retrospect of our doings, and consider what plans may enhance our future usefulness.

Thirteen years ago a few of the fruit growers of this State met and organized this Society. Have their hopes been realized? Let the increased interest in fruit culture in all parts of our State answer. Not only has the apple product increased wonderfully during that period, but the smaller fruits have won a place in nearly every garden, and have become a source of profit to many of our people.

Has the Society finished her work, and is there no further need for organized effort? It seems to me that we are just beginning, and need now, more than ever, these meetings, to discuss the result of our labors, and learn from the success or failure of others. Especially do we need them for mutual encouragement, when, as at present, every one is complaining of "hard times," that our courage may be renewed by the enthusiasm of the more hopeful, and our confidence strengthened by the success of their ventures.

There is much to be done in the matter of nomenclature. Thousands of dollars are wasted every year in putting out spurious, and even utterly worthless varieties of fruit, through the misrepresentations of agents, the mistakes of nurserymen, and the ignorance of varieties among the planters themselves. The exhibitions of this Society have done much to correct this last trouble, and I believe we should do more to expose the wiles of the dishonest tree peddler —that enemy of the fruit grower—who does not, like the borer and codling moth, lie dormant during the reign of frost and snow. It is so easy to be persuaded by the glowing descriptions, and still more glowing colored plates with which the smooth tongued fraternity are provided, that the honest, unsuspecting farmer needs frequently to be reminded that a man of practical experience in orcharding is a much safer guide as to varieties, best in themselves and best suited to his location and requirements, than is the wily agent who makes his largest profits on new and untried varieties, and whose interest it therefore is to recommend them, in preference to the old and reliable standards.

A matter of great importance to the fruit grower of the present day, is the better care of his orchard. Trees are allowed to struggle for existence, which, enriched, and with a little extra care, would pay a large per cent on the investment. With such attention and thoroughness in cultivation, we secure larger, finer fruit, which will meet with a ready sale, at remunerative prices, even in a year of plenty, when inferior fruit will hardly pay the expense of picking and marketing.

We need a reform in the matter of sorting and packing our fruit for market, that shall give us such a reputation as to enable us to command better prices. This is especially desirable in a year like this, when our apples are nearly all sent to foreign markets. Too frequently the orchardist, in his greed for present gain, forgets that his reputation is at stake, and allows his apples to grade from No. 1,

at the ends of the barrel, to No. 3, in the centre. Dealers in fruit are somewhat to blame in this matter, in not making more difference in price between strictly fine and poorly sorted fruit. They should also oblige the grower to brand his package, and when poor fruit is found the blame could be placed where it belongs. In many cases the buyer does the sorting, and not wishing to give offence, hoping to buy another year, will not insist on the requisite thoroughness.

With another season of abundance, we hear the cry of "over-production"— "orcharding does not pay." Notwithstanding this complaint (with which we have been familiar for the last twenty years), we claim that we can compete successfully with any section of this country. Our climate enables us to raise apples that will keep firm and bright until spring, and therefore are valuable for shipping, after the more perishable western-grown fruit is out of the market. Maine Baldwins are selling at the present time, in Liverpool, higher than those from any other section. This, with our proximity to shipping points, and comparatively low freights, gives us an advantage possessed by few States in the Union.

A few years ago Michigan apple growers were despondent, and thousands of bushels rotted on the ground—this, too, at a time when American apples were selling in London for 20 to 26 shillings sterling. Choice winter apples were sold last fall in some towns in Central New York for 12½ cents per bushel on the trees. In both cases, distance from market and impossibility of keeping late are responsible in part for such loss. Can any one point to the time when good winter fruit, hand picked and well packed, would not sell for a remunerative price in Maine? When we compare the price of land here, where some of the best orchard land is almost worthless for any other purpose, with the value in some of the best fruit sections of the country, where land is worth from $75 to $200 per acre, together with the other advantages enumerated, is it not at once apparent that Maine ought to raise ten barrels of apples where she now raises one? Another question which arises in connection with the subject, is the practicability of keeping our apples until the glut in the market is over. The loss from shrinkage and decay is frequently so great as to discourage growers, and many apples are crowded upon the market at very low prices, which could be sold to much better advantage in the winter or spring. We think there would be no difficulty in keeping apples, if the cellar were kept at a low, even temperature, about 32° to 35° F., and they were stored in open bins.

This may not always be feasible in the house cellar, in which case a cellar may be dug under the barn, or outside, like a celery pit.

In conversation with one of our leading fruit growers, a few days since, he related his experience in keeping apples in barrels and in open bins in the cellar. There was a loss by decay of 15 per cent in the apples barrelled, while those in the bins were perfectly sound and bright. He urged us to bring this before the people, as it would be of great importance to those storing apples.

I would suggest for your consideration, the feasibility of teaching some of the principles of horticulture in our public schools, as comparatively few of our boys can attend the Industrial College. The tendency of the times is to teach those subjects which will be of practical advantage in business. The different branches of fruit growing and gardening are good trades in themselves, and it would be pleasant for men in almost any business to know something about the culture of fruits, vegetables and flowers. How to sow seed, to transplant, to graft, bud and prune; to make hot beds and propagating houses. Could we get our boys interested in some of these things, perhaps there would be more love for the farm and less eagerness to rush off to the city, or to some distant State, on attaining majority. I would suggest that the best way to accomplish this would be to begin with some plain lectures on the subject before the school. An interest in these things once aroused in the mind of an intelligent boy, and all nature is full of object lessons for his special delight and instruction.

One more question, and a most important one: How can we interest more of the fruit growers, so that they will join with us and assist in building up the Society and extending its influence for further good? You must be aware that comparatively few of our large fruit growers are actively interested in the work of the Society. They may be in sympathy with us, but do not see the importance of meeting together. Nearly every one of these has some specialty in which he excels, and he knows some things about it that others do not, which he ought to contribute to the general fund of information, and at the same time he can reap the benefits of others' experience. One of the best things accomplished by the Society is the bringing together of inquirers and men of experience.

Often, men who cannot or will not embody their ideas in print have a large fund of information which may be elicited by careful questioning. It is not enough that a few of us meet from year to

year for mutual exchange of opinion and discussion; some way should be devised for bringing the Society into nearer relation to the masses of the people. I do not propose a remedy for this, but leave it, with the other topics presented, for your consideration, not doubting that your combined wisdom will be equal to the emergency.

The President's address was referred to a committee, consisting of Messrs. R. H. Gardiner, S. R. Sweetser and Orrin McFadden, with instructions to consider the same and report such action as they deem proper on the several subjects therein mentioned.

Messrs. S. R. Sweetser, Levi Russell and J. M. Carpenter, were appointed a committee to examine the fruit exhibited at this meeting, and report thereon.

The following paper was read, in the absence of the writer, by J. M. Larrabee, Esq., of Gardiner:

OBSERVATIONS ON FRUIT CULTURE IN MAINE.

By J. W. LANG, of Bowdoinham.

Orcharding is a vast subject, and one which, as a whole, could receive but a cursory glance in the limited time assigned to this paper. Without attempting even an outline of the whole, I shall endeavor to present a few important points in a practical manner.

The soil is the source from which plants derive their chief support. It is something more than a mere pedestal for plants and trees to stand upon. It is a supporter in several senses; it supports in the sense of holding up; in the sense of maintaining and feeding; in the sense of secreting, supplying and keeping reserve force. It contains the power of co-operating with the tree or plant in transforming itself, inert and useless otherwise, into active and useful forms. The soil is the first field for operation in fruit culture. It is also the last that can safely be neglected. It is the last to fail if intelligently handled. Any well-drained soil is good for apple trees, or other fruit trees. Well drained, not only naturally but artificially except in those soils where nature has, in fitting them expressly for fruit trees, spoiled them for almost anything else. A porous subsoil or well-laid underdrains are demanded. But we must not stop at well underdraining, for the soil should be further fitted for parting with surplus water by thorough pulverization; and kept so by judicious mulching. The soil must be prepared thus for the escape of water and the entrance of air. It is then ready to be fer-

tilized. In manuring fruit trees, many pile the manure about the trunk, as though it was a house to be protected from frost or a post to be braced. The rule should be to fertilize and mulch the *land* instead of the tree. If there is food for the roots in the soil, they will find it. If it is piled about or near the trunk it is practically out of their reach.

In setting trees on underdrained land, I should prefer to set them immediately over the drains, so far as practicable; for this would give the tree the best possible position for drainage, and the extending roots would be away from, instead of toward the drain. If the land was being drained for an intended orchard, I would fill the drains partially in the fall, and in the succeeding spring set the trees over the drains, as the filling went on. This would save labor in the setting.

It is difficult to cultivate an orchard set in the usual way without injury to the trees from the team or implements. I am inclined to believe, both from observation and experience, that it is better to set trees in long rows—quite thickly in the row, with wide spaces between the rows. If set 12 to 20 feet apart, and the rows four rods distant from each other, it will be found more convenient in working among them with plow, mower or rake, or in carting either fertilizers or fruit. On many farms, sufficient orcharding may be had by setting rows of trees by the roadside and along permanent fences. It has been found that trees do particularly well beside fences, especially stone walls. This arises in part from the partial mulch which the fence affords, and in part from the deeper and longer retention of snow. They are practically out of the way of the plow, or other farm machinery. It may be suggested that many apples would be injured by falling on the rocks or rails of the fence. But this is really small objection if the fruit is poor, and still smaller if good, for then hand picking, the only right way to gather fruit of value, would be the more imperatively required.

We have seen many good orchards set and grown in gulches, on steep hillsides, and other waste places. We have also seen hundreds of other similarly good locations naturally that are as yet unutilized. Here is a hint to many. Trees on such grounds may be set irregularly, and in the most convenient places, and set thickly. The touching of limbs here affords support and shade, and the benefits of a partial mulch. The sharp slope or rocky nature of such lands affords a natural drainage, and imparts a ruggedness and

hardiness that often gives peculiar thrift to the trees. We believe there are sufficient waste places, and caves, and nooks in the State to put all the existing orchards and fruit trees into—out of the way, if the expression is allowable—and to their improvement as a whole. If this idea is true, think you for a moment of the vast unutilized resources for orcharding we have that we have scarcely begun to appreciate, and that but few have ever seriously considered.

Sandy soil is not generally considered good for orcharding, but we have seen many very good orchards on sandy loams, and no one need hesitate or despair of having an orchard because of this. Thrifty trees, well set (and somewhat deeper than in heavier soils), liberally mulched with muck and ashes, and the whole soil well supplied with coarsely ground bone worked in evenly several inches deep, will give a good growth and make healthy trees. If such soils have their *outs*, they have their compensations. They are well drained naturally, easy of cultivation, and generally "lay well." They also afford poor shelter to insects.

The lighter clay loams are fair orchard lands, especially along the borders where they shoal to meet rocky ridges or lap on to gravel loam. We have seen many good orchards on such land, and hope more attention is to be given them in the future. They should be carefully drained, if at all needing it. They are strong retention soils, holding fertilizers well and requiring but light mulching. Much of this class of land is underlaid by a porous or partially porous subsoil. Pear trees are particularly at home on clay loams. The Red Astrachan is one of the varieties of apples that does well on a heavy clay loam. The Yellow Bellflower is another.

We have especially spoken of the two extremes of soil—sandy loam and clay loam—to show that orchards may be raised profitably on them, and to encourage those having such soils to try. It requires more care and skill, but success is often all the more marked in the end, where harder to obtain. On other rocky, gravel loams, where trees come on almost by themselves, and the fields and pastures have strong, vigorous volunteers, orcharding may be pursued as a specialty and to a large extent. No section of our State is destitute of much land of this kind. It is on these we expect to see orcharding have its widest expansion. Growing Baldwin apples in Maine is as promising in outlook and paying in returns as growing oranges in Florida, and not attended by half the privations and disadvantages. We hope citizens of Maine will learn this fact in the

near future; and not only learn it, but learn to accept it and practice it.

If there is one point in fruit culture that needs impressing more than any other, it is that of fertilizing. More orchards are starved to-day than are well fed. More poor apples than good are produced, and largely for the want of manuring. It is a thing we should dwell upon. Too many orchards get no plant food except what they forage. Too many people give what little dressing they apply to the orchard grudgingly. If orcharding is worth pursuing at all, it is business to work it for all it is worth. The quicker young trees are grown, the less time the borer and the caterpillar, the woodpecker and the canker worm have to work on them. The sooner they are driven to bearing size, the sooner the investment will pay.

Fred W. Ritchie, of Winterport, a successful orchardist, says: "I cannot raise such apples as the market demands, such as will bring the highest price, and such as I want, without liberal manuring and cultivating. I should as soon think of raising good corn without cultivation and close attention, as good crops of apples." We might glance over the State and present a long list of names of successful orchardists, and not one would present an example of success without effort.

[The writer here mentioned numerous instances of the successful cultivation of orchards, in various sections of the State, showing the practical benefits of high cultivation.]

The lesson is: The tree that has the most and best plant food at its disposal, succeeds best.

The hardier and earlier varieties of grapes can be grown with little care and attention, and as successfully as an apple tree. They ought to be produced in abundance on every farm. They require but small space; and, grown about the dooryards or the buildings, are ornamental as well as useful. Change Scripture a little to suit the climate, and with a little effort, all may sit beneath their own vine and apple tree.

The subject of fruit growing is receiving increased attention in Maine. At no previous time in the history of the State has so much attention been given to planting of new orchards, or to the intelligent care of those already existing, as during the few past years. Apples in our local markets are often scarce and high. Discussions

of horticultural methods and practices are pursued with more interest than formerly. Results are more narrowly watched. Experience is carefully sought to guide the amateur.

The great central and southern belts of the State, more especially west of the Penobscot river, are finely adapted to apple growing. The western and northwestern sections will produce Baldwins hard and firm almost as the rocks they grow among. Even the northeastern portion produces good apples of the very hardiest or "ironclad" varieties. Aroostook is as yet by no means to be given over as a hopeless fruit section. In its borders plums are particularly free from insect enemies. Pears grow finely on our clay loams, and are thriftiest and most productive near bodies of water. Maine apples have long keeping qualities, are hard and firm and bear long transportation well. There is a tendency to grow fewer varieties and larger quantities of standard sorts; especially those which from experience have proved adapted to our wants, are good keepers and staple in the markets.

The future of Maine fruit growing is, we trust, to be a bright one. The increased attention which it receives seems to warrant the prediction. Not only are more and more apple trees set each year, but small fruits are receiving attention also. Although there is much of improvement to be made, yet the beginning is so far good. Strawberries are receiving attention. Demand far exceeds supply. Our strawberries, coming into the market late and in good condition, bring a good price. Late supplies of this delicious berry often bring as good prices as the earlier ones from more southern States. Cranberries are the natural product of many bogs and lowlands, and are cultivated with profit in parts of the State. Cherries and plums are considerably grown in spite of black knot and curculio. Peaches are produced in favored places in quantities sufficient to be a market crop. Grape culture is on the increase. Raspberries and blackberries are not much cultivated, the wild product being as yet too plentiful. But they will soon command attention. The gooseberry and currant have not yet recovered their former importance since the advent of the currant worm.

The State Pomological Society is doing a good work. Its annual meetings, exhibitions and reports are valuable. It exerts a marked influence on the fruit interests of the State. A good society is a power for good. The power of organization is mighty in results. It is helping set Maine along the tide of progress to be one of the

best fruit States of the near future. Its work should be appreciated and sustained.

None are too old to plant trees. The grandsire may outlive the grandson. It is a beautiful thought that we may leave a legacy of beneficial fruit trees behind us; that they may wave their green and golden benedictions over our graves, and over the old homesteads long after we are known on earth no more.

If such lands, in quality, price, contiguity to all that blesses life in our own New England, lay in Florida, California, or the far west, it would only be necessary to advertise them liberally to draw their present inhabitants, almost by an exodus, to their land of promise. It is said familiarity breeds contempt. The fairest portions of the earth are inhabited by the most indolent and inappreciative people. Shall we, here in this good old State of Maine, close our eyes to the wealth beneath our feet or the beauty over our heads? Shall we go to miasmic Florida, the cyclone swept west, the arid lands of the Pacific slope, to raise fruit we can equal at far less expense? God forbid!

The introduction of establishments for, and the practice of, evaporating apples is adding much to the revenue hitherto derived from our orchards. The product is enhanced in value one hundred per cent, and not only this in both price and quality, but a class of apples hardly salable before, comes into demand. It opens up encouraging prospects for raising those kinds of apples that are hardy, prolific, and of low value for dessert. The evaporating business has obtained such a foothold, and been such a success where tried, that we may reasonably regard it as one of those innovations that are improvements, and that has come to stay. There is little danger that the markets will be overstocked with a good product, and should such an event occur, it is not likely to be of long duration. It is wise policy to encourage good evaporating operations in our midst.

Living here, pleasantly situated amid all that makes life desirable, surrounded by all the facilities the temperate zone affords, or the others contribute, in quick and easy communication with all the world, with the best of markets at our very doors, why shall we not thank God and take courage in the production of more and better fruit year by year? It would seem to be flying in the face of a most kind and beneficient Providence not to do so. No branch of the old home farm has more of promise or of profit in it. The

village plot is not excluded. The hill-side and the valley are competitors. Women and children may engage in it. There is much that fits the kindly touch of the hands of the gentler sex in it. Its pursuit doubles and quadruples the value of the lands on which it is pursued. It beautifies and elevates the home, and refines the character.

"Better than gold is a peaceful home,
Where all the fireside charities come—
The shrine of love—the heaven of life,
Hallowed by mother, or sister, or wife.
However humble the home may be,
Or tried by sorrow by heaven's decree,
The blessings that never were bought or sold,
And center there, are better than gold."

DISCUSSION.

THE SECRETARY. I object to the recommendation in the excellent paper which has been read, of setting trees directly over the drains, and especially to doing this at the time of filling the drains. Drains, in a soil which needs underdraining, will, during a large portion of the year, contain water, and always moisture. The roots of trees seek moisture, and if placed directly over the drains, will extend downward into the drains, instead of "away from them." The choking of drains by roots is a fact of frequent occurrence, and when a drain needs repairing it will be impossible to uncover it with a row of trees standing over it. On the other hand, if the drains are placed midway between the rows, they will tend to draw the roots to the greatest possible distance, will be for a long time free from the danger of choking, and can be uncovered for repairs without destroying the trees.

The recommendation to plant trees in "out of the way places," if intended as a general rule, does not meet my approval. A good orchard, designed to be a permanent source of profit and pleasure, will not be "in the way," in an offensive sense, if given the best and most convenient location which the farm affords.

The writer has not over-stated the importance of high cultivation, or of intelligent and constant care in the growth of an orchard. Too much importance cannot be attached to the subject of producing a vigorous growth and early development of the trees, or keeping up the fertility of the soil.

EX-PRESIDENT GARDINER. About planting trees over drains—I would like to speak of an incident that happened at Oakland some years ago, which bears out Mr. Sawyer's objections. In those days, before we knew much about drains or drain pipe, it was almost universal to use logs; and all the water that came to the house and barns was brought in logs through the old orchard. On one occasion I remember that the water supply began to fail, gradually growing less and less. It was a long time before the cause was discovered, but at last, by digging down to the drain, it was found that an apple tree root had grown down and found a knot-hole in the log, and had gone in through it, and had grown so large as to stop the flow of the water. It merely shows that the inclination of the roots of trees is to find water. If a tree is planted over a drain the roots will find their way into the drain and fill it up. It is a very remarkable fact that roots will always go to find water.

D. J. BRIGGS. I merely rise to state a fact from my own experience in regard to setting trees on drains. I have one small apple orchard in which a part of the trees are set over the drains, and those trees that are set between the drains are as hardy, as productive and as large as those on the drains.

Another point in the paper which has been read is in regard to the production of grapes in this State. I think that the subject of grape culture should not be brought forward as a matter of general interest in a pecuniary point of view. It may be discussed in farmers' clubs, but we know that we cannot as a general thing produce grapes in this State profitably, because there are other localities that produce them more easily and more abundantly, and get them into market before we can.

One point in respect to what the president said in regard to apples, that ten barrels should be grown where there is now one. A neighbor said to me this winter "if all the trees bear where apples can be grown, it will be the best farming we can do, at $1.25 per barrel from the orchard." I heard of none being sold for less than that price last fall; yet without putting them into the cellar this is better farming than anything else we can do. I believe instead of raising one hundred barrels of Baldwins as I did, it would have been better if I had had a thousand barrels. I believe the more good fruit we can raise, the better the market will be. I have repeatedly said this to this Society, and I still adhere to it.

Another point in Mr. Lang's paper in regard to raising the standard varieties; I don't believe in raising all standard varieties. We see in the English reports, that fancy varieties brought very high prices. For instance: The Fameuse, Gravenstein, and King of Tompkins County.

I believe that if a young man is going into orcharding, he should look at the nearest orchard he can find that has been productive, and see if the soil is similar to his; if so, follow the example. In the vicinity where I live, I can raise russets quite well; a hundred rods south of me they cannot raise them with any profit. Mr. Gardiner will raise Bellflowers, but I have discarded them. I have tried for the last ten years to raise them, without success.

There is another point—that a person will set out an orchard, perhaps well, and think the work is all done, when it is only the commencement. It is work all the way through—eternal vigilance. We must raise better fruit to compete with other sections. We have to fight our enemies—we have to feed ourselves. We have got to feed our trees also. The question will arise, What shall we feed them with? I feed mine largely on potash. I buy ashes and spread them broadcast in the orchard. I advocate, in planting corn, to plant *corn*, and not beans or pumpkins. I don't believe you can profitably plant an orchard with other crops.

The first animals that I turn into my orchard in the spring are sheep and hens. When the sheep commence gnawing the foliage and shaking the limbs, they are taken out, and pigs are put in. These are kept there till the apples become fit for making cider, then these are taken out, but the hens continue to run there. I believe the hens are a source of income, and that they pay for all the apples they devour.

W. P. Atherton. I rise to speak of some points in the paper which has been read. One is in regard to setting young trees over drains. I drained a piece of land, one-half acre in extent, and instead of setting trees over the drain, I set them between, thinking it the better course. My idea was, and is, that the roots of apple trees are reaching out for moisture, and they must have it; and if you put the trees over a drain, the natural tendency of the roots will be towards the drain and into it. If any one is thinking of underdraining and setting out trees, avoid setting the trees over the drains.

One other point I wish to emphasize, in regard to setting apple trees in "out of the way" places. My experience tends in a different direction. I want my trees where I can give them the best culture and attention; not in a poor, out of the way corner. There seems to be something contradictory in the paper. The writer advocates getting all that we can out of the apple tree while young; to drive the tree to its full growing capacity. I think it is impossible to force a young tree into bearing while young, and at the same time make it develop in growth. My idea is that if you drive a tree you will stunt its growth, therefore I would not advocate it; but it all depends upon circumstances. If you are setting a variety of fruit from which you wish to derive the greatest profit, and don't care so much for growth, Iwould say set the trees close and feed them high while young. That may be poor advice in some cases, it would be so in regard to the Rhode Island Greening, Northern Spy and Talman's Sweet. I should prefer to get a full growth and let the trees become somewhat mature. I know of a man who was getting all he could from his trees while young, and had four acres of trees set half a rod apart, making six hundred and forty trees to the acre. That was extremely close. They were the Duchess of Oldenburgh. Some of them were as large as a man's arm, and the tops had begun to come together somewhat. I asked him what he was going to do, as I believed he could not get them to grow and become mature. He said he did not care so much about that, he should cut out some of them. With that variety, and perhaps some others, it would do very well. There is the Wagener, if I had a hundred trees of that variety, I would set them close together. I don't believe in keeping sheep in the orchard, but circumstances alter cases. Top dressing is better than keeping sheep, for me.

Mr. GARDINER. I noticed in the paper by Mr. Lang, an allusion to the woodpecker as an enemy to fruit culture. I would like to hear about it. Some say they are useful in destroying insects, and some that they suck the sap from the trees.

Miss ALICE FOSTER. I have an apple tree which is completely girdled by woodpeckers. The holes are not more than a quarter of an inch apart in limbs ten inches through, and the tree is certainly ruined. I think they come for the sap. I think the tree is fifty years old. It is gradually dying.

S. R. SWEETSER. I have an impression that there are several kinds of woodpeckers, and that the one we call the sap sucker is

injurious to trees. I have watched them. They appear as though they were sucking the sap. I have noticed them in the fall, as a general thing.

Mr. SAWYER. Is it not, in fact, in the fall and winter that you see them most frequently?

Mr. SWEETSER. I think so.

Miss FOSTER. I have seen young trees where the woodpeckers have bored into them so as to stop the sap from flowing.

L. F. ABBOTT. In regard to the time that the woodpeckers come, I should say in October. I have seen them on trees at that season. One fine tree that I had, about four inches in diameter, was entirely spoiled by them. That was done in October.

J. M. CARPENTER. Do you understand that the number of trees in this State that are destroyed in this way is very large? It appears to me that if we have no worse enemies to contend with than this one, we should get along well enough. I have yet to learn that much damage is done by them.

I would say in regard to the matter of drains, that a member of our family came into possession of a farm where the drain was choked that ran from the cellar through the orchard; it was made of logs. Soon after, we found it choked, we dug down to relieve the cellar from the water, and we found the very place where the roots of the trees had gone into the drain and had blocked it up entirely, so that it was a curiosity. We had to cut them away with axes. It proves that the tendency of roots is to go towards the water, and I should think it would be an unwise thing to do, to put trees on top of a drain. I am sure I should put the trees between the drains, rather than upon them.

Mr. BRIGGS. I want to say, in regard to planting trees in out of the way places, that I believe in taking the best land on the farm and nearest the buildings. While land is cheap, it would be well enough to set trees forty or fifty feet apart, in out of the way places; but where land is in good condition, put them closer. I have set my orchard too thick; one small orchard has one tree to the square rod, but from twenty-three to twenty-five feet apart is better.

There is another point I want to speak of, in regard to trees cracking in the spring, after the sap begins to flow. I cannot think of any reason but the expansion of the wood by freezing. I would like to know if any other orchardists experience the same trouble.

Mr. GARDINER. I remember, a good many years ago, after the cold weather had began, there came some warm weather, then it became cold again and I lost a great many trees. I attributed it to the warm weather which had started the sap, and the sudden freezing afterwards, causing a sudden expansion and contraction. I lost many Baldwins at that time.

Mr. SAWYER. I would like to ask Mr. Briggs if he ever saw the bark cracked on a tree that had all its branches down to the ground —had not been trimmed up?

Mr. BRIGGS. Yes, sometimes. I noticed it on some that were particularly thrifty.

Mr. SAWYER. I have in mind some trees that never were trimmed. They are trees of considerable height, with very large tops; but the branches start very near the ground, so that there is no place where the sun can shine on the trunks. The bark on these trees is green and smooth, except as it becomes thickened in the process of nature, when it falls off in flakes or scales, and never cracks. Now I believe the cracking results from the unnatural condition which we produce by this high pruning. I have found that by slitting the bark the entire length of the trunk, so as to give room for the expansion of the tree, the splitting or cracking of the bark is prevented. A clean cut through the bark, made with a sharp knife, will heal in one season, and the width of the scar will show very nearly the increase in the circumference of the trunk. The tree, when the sap starts, must expand. If it has an unnaturally hardened and rigid bark around it, something must burst or the tree cannot expand. I think that is all there is to it. If you slit the bark of a hide bound tree in that way, you will see no bursting, and the tree will grow much better for it.

Mr. L. H. BLOSSOM. Would you advocate splitting the bark?

Mr. SAWYER. Not unless I saw some necessity for it. I think you can tell by the appearance of the bark of the tree whether it is in such a condition that it needs to be relieved, and I think it is safe to say it will do no harm, if your tree has reached that size where there is a possibility of its bursting.

Mr. BLOSSOM. Will it make any difierence on which side?

Mr. SAWYER. I think not. If you split the bark in the spring, you will find in the fall a wide scar or seam, proportionate to the size and vigor of the tree, and inside of that space there will be a new bark.

Mr. Blossom. I have been troubled, as Mr. Briggs has, with the bark bursting. I have lost quite a number of trees in this way. The bark seems to dry right on to the tree, and after a while this part will all peel off.

Mr. E. A. Lapham. Sometimes on my trees the bark dies on the north side, sometimes on the south. Sometimes I have taken a knife and cut around it, and the rest of the bark seemed good then.

Mr. Carey. In regard to trimming the apple trees, I have in the last year made a practice of cutting through the bark on the body of my trees, and I have noticed that many of them have grown more since I have split them; and I think it is a good plan, especially with a young tree and perhaps in some older ones.

Miss Foster. My Baldwins particularly, have troubled me by splitting.

Mr. Briggs. At what time of the year?

Miss Foster. In the spring.

Mr. Briggs. I have had but little trouble with the bark bursting. That fall when we had a very heavy frost I noticed three or four trees where the bark, a little way from the ground, had burst. One tree was a Porter, another a Red Astrachan, and one a Baldwin. These cracks were not on any particular side of the tree. Had I gone right then and bound them up with clay, or something else, instead of waiting till spring, it would have been better. If I should ever notice anything of that kind again, I should attend to it immediately and bind it up, and then I should save it. I don't know what the cause was unless it was too rapid growth. I have had some trouble with young trees which would all dry up. I don't know whether it was on account of the mulching. I believe the sun is an aider and abettor of our work. There is a great deal of power in the sun, in helping to strengthen the bark. I believe we should not put the mulching too close to the trunk. I would like to hear what the President's experience is.

The President. My only trouble has been with the Gravenstein. Several people have made complaint that in the spring the bark would split entirely around the tree.

Mr. Briggs. Does not this trouble occur in the fall, and escape your notice till spring?

The President. I do not think so.

After a brief discussion on parasites and insect enemies, in which nothing new or important was elicited, the meeting

Adjourned.

EVENING SESSION.

At the opening of the evening session the following original poem was read by the author:

FLAMEN POMONALIS.

By J. M. LARRABEE, of Gardiner.

In ancient days of myth and gnome,
When gods and goddesses, in Rome—
With temples numerous and grand,
And altars crowned on every hand—
Held sway; when nymphs with thoughtful care,
In human labors had a share,
And loved and were beloved in turn—
As human hearts for love's light yearn—
Pomona, fairest of her race,
Among the fruit-trees held a place.
And from her garden, orchard, field,
Produced by skill the highest yield.
And while she helped with cultured hand
The growing products of her land,
Or gathered fruits in garners laid
For future use: This virtuous maid
Determined in her heart, that she
A celibate for life would be.
So shutting up her garden gate,
The young gods left outside to wait.

Vertumnus sought by human guise
This virtuous maiden to surprise,
And many a cunning scheme he planned
To win her virgin heart and hand.
Sometimes a reaper lad was he;
Again a plowman he would be;
Sometimes vine dressing was his plan;
A soldier next, or fisherman;
But all in vain: the obdurate miss
Would never grant a single kiss.

Pomona, watching, saw one day
An aged woman pass that way,
And bade her, with a kindly smile,
To stop and rest herself awhile.

The woman, talkative and gay,
Related in a pleasant way—
As any garrulous woman would—

The gossip of the neighborhood.
Her manners gentle, unrestrained,
Pomona's confidence obtained.
She, still conversing, did relate
The blessings of the marriage state;
The joys that crown a loving wife;
The evils of a single life.
The charming nymph was not amazed
To hear the god Vertumnus praised,
And then first felt within her heart
The painless sting of Cupid's dart.
Then saw a transformation strange,
The woman to Vertumnus change.
The nymph of fruit became with pride,
The god of season's lovely bride.

Pomona's worshipers, with cheer,
Their sacrifices made each year
To her, that she in preservation
Would keep the best fruits of the nation.
Her *Flamen Pomonalis* stirs
The hearts of all her followers.

Fair nymphs and goddesses to-day,
As deities have lost their sway,
Our "Hamadryads" by their arts
Become, each one, a queen of hearts,
And placed, each at her fireside,
As goddesses at home preside.
But still, upon the roll of fame,
We find Pomona's honored name;
Her pomological relation
Is seen in your Association.
Pomologists of wintry Maine,
The virtues of the nymph retain;
The super excellence of their fruit
Proclaims them members of her suite,
And many a Pine Tree orchardist,
Pomona's "Maiden Blush" has kissed.

Then "Seek-no-farther," "Northern Spy;"
Next summer "William's Favorite" try.
And should you an "Early Harvest" plan,
Forget not bright "Red Astrachan."

And when the "Pumpkin Russet" turns,
And "Sops of Wine" your stomach yearns,
When "Moses Wood" is "President,"
When "Rambo" wins the "Beauty-Kent,"

When "Minister" becomes a "Dean,"
And "Duchess Oldenburg" a queen,
Then let your "Granite Beauty" meet
On "Kilham Hill" her "Franklin Sweet;"
And have your "Fameuse" "Porter" wait
Beside the "King of Tompkins" gate—
Above his head the "Hightop Sweet,"
The "Garden Royal" at his feet—
Until he sees the "Golden Ball"
Ascend above "Tetofsky"(s) wall,
Then "Jonathan" and he can eat
Each "Twenty Ounce" of "Superb Sweet;"
But should his "Mother" hungry get,
She'll send him off to "Somerset,"
From good "Benoni" to obtain
A "Nodhead" and a "Blue Pearmain."
Should "Hubbardston Nonesuch" allow,
But "Chase" him with a "Yellow Bough,"
Then "Sarah" will be pleased I ween,
If he brings home a "Gravenstein."

Pomologists: If we are wise
We all shall seek "Sweet Paradise,"
Or at "Peck's Pleasant" quarters stay
When "Gloria Mundi" slips away,
And let us, when the "Winter White"
Shuts "Winthrop Green-ing" out of sight,
Rest till the "Bald-win"(d) rudely shakes
The "Golden Russet" down in flakes;
Then shall the "Ladies' Sweet" be ours,
Enwreathed with fairest of "Bellflowers."

The following paper was then read by the writer:

THE NURSERY BUSINESS IN MAINE.

By W. P. Atherton, of Hallowell.

Mr. President, Ladies and Gentlemen:

In the presentation of this subject for your consideration to-day, I beg your indulgence and closest attention, and you will allow me to say that I take this liberty because it is an old subject and may not seem to claim any attention, and, furthermore, that I have chosen this one with some reluctance, being well aware that it is delicate if not dangerous ground, and that I must tread softly, and yet with a strong desire to do good. My only object is good and

not evil. My only object is the dissemination of knowledge and the right kind of knowledge. I love my native State and I love to see every form of industry prosper, from the plow to the loom. The resources of our noble State are boundless, and our farmers ought to produce every pound of beef, every bushel of corn, and every barrel of flour we need or that we can possibly consume. We ought also to produce every tree and vine that we need. Orcharding here in Maine is but in its infancy, and as the nursery is the source from whence is procured the foundation of the orchard, this business needs to be greatly encouraged. It has done much for us in the past, it may do more for us in the future. But there is no need of our sending out of the State for trees. We might produce them here. Several Maine nurserymen have in years past been engaged in the business and have propagated and disseminated thousands of good trees. Why have many of them gone out of the business? Why has it not proved successful? There are reasons surely, and it will do us no harm to consider some of them. I will begin Yankee-like by asking the question: Why has the nursery business in Maine failed to meet the wants of our orchardists? First, it has failed from a want of capital; second, it has failed from a want of a thorough knowledge of the business, and thirdly, it has failed because it has been attempted as a temporary resort instead of being pursued persistently as a permanent business. The nursery business to be conducted properly, requires large capital, extensive grounds, and an abundant supply of manure, especially if the object be to meet the demands of the market. Should one man or a number of men want one hundred thousand trees at one time, the nurseryman must be able to furnish them from his own stock, or from some one in the same business near at hand. Now, if a man has the capital, the necessary grounds and the requisite knowledge to begin with, it will of course be of great advantage, it would help him along amazingly, but it is not absolutely necessary that he should; he could begin in a small way and enlarge his capital as his business increases. It is true, large orders might come in when the business was small, and it would be somewhat mortifying and discouraging not to be able to fill those orders, and have them go elsewhere, but the only way would be to put what you have on the market in good shape, and work the business up gradually.

But this does not militate against what was stated at the first, that a man must have capital if he would be successful; it is one of

the requisites to success, whether obtained at the start or after years of persistent labor. Now if the nursery business here in Maine has failed in any degree to meet the wants of our people, and I think it has, it is because of several reasons, one of which is a lack of capital. We don't lack the right kind of climate, we don't lack the right kind of soil, in Maine It has been abundantly proved by several who have attempted the business, that nearly all of our varieties of apples can be safely and successfully budded and grafted in the nursery, about the only exceptions being the Baldwin and Roxbury Russet, and even these perhaps might be, could they be tested thoroughly and intelligently and under circumstances wholly favorable to them. In latitude we are only sixty or sixty-five miles farther north than the Rochester nurseries, New York, while we are one hundred and ten miles south of the Woodstock nurseries, New Brunswick.

Second, it has failed because men have entered upon it without any knowledge of what the business required; they have thought in too many cases, that all that was necessary was to sow a few rows of pumice seed and to give a little hoeing and thinning when the plants were growing; they have failed to perceive that two or three acres of half starved and half neglected seedling or grafted nursery trees amount to nothing, that they have selected the wrong soil, and have failed in drainage and in protection. I know of one nursery that went up in three years because it was planted in a low, damp place; they were seedlings, not forced but grown slowly in a fairly rich soil, and they nearly all winter killed in one winter. I know of another nursery, abandoned several years since because the soil was not suitable, it was a strong clay; trees transplanted from this soil to a rocky, gravelly loam, felt the change to be an uncongenial one, and refused to grow for a long time. Another nursery, and a large one, was abandoned or sold out a good many years ago from a want of practical knowledge to carry it on properly; some good stock, undoubtedly, was sold from that nursery, and some bad stock too, and it was the bad stock that helped the downfall. It will not do to sell all stock on the bare reputation of the nursery, it must have an intrinsic value; the farmer wants something besides pedigree when he buys a cow, and the orchardist is not to blame if he is just as particular. Another nursery, and one that was pretty well conducted generally, was recently given up because the proprietor, as he says, could not compete with western

trees. But the real trouble was the lack of a true appreciation of what the business required; the owner was a man of more than ordinary intelligence, and he knew the nature and requirements of the apple tree as well as any man, but he knew the theory better than the practice; he knew that he had not the time nor the means to give the trees proper and sufficient pruning; he knew that he could not, or rather that he did not, protect his trees from deep, drifting snows, and he knew that the land selected for his nursery, though naturally a good soil, needed to be thoroughly underdrained; and knowing all this he continued for awhile to raise and sell trees, good, bad and indifferent, but failing to receive that patronage which he expected, he went out of the business, laying the blame wholly upon the western tree vender, not realizing then, and perhaps not now, that the real seat of the difficulty was at his own door. It is impossible to raise good, sound trees on undrained soil; they will give dissatisfaction sooner or later. I said that some failed from a want of knowledge, but this man had some knowledge, and yet he failed to comprehend what the business required and what the farmers required. And still another nursery has but recently gone up, or been sold out because the proprietors cannot properly attend to the business; more likely I should say, because they do not understand the business. It is a business that requires not only a knowledge of some things, but a knowledge of a good many things, and the good many things we will come to by and by. Others might be named, but doubtless the failures which have come under my notice are but a part of the great bulk of failures throughout the State.

The third reason why the nursery business in Maine has failed to secure the best results, is because some have resorted to it only as a temporary expedient or speculation. Not having the time or inclination to give it the study and investigation which it requires, they have carried it on in the most slovenly and slipshod manner possible, and the consequence has been, that the public has either given them a wide berth or purchased sparingly of their wares.

Now, what I mean by a temporary resort, is this: some farmer imagines that he can sow a small plat of ground with apple-pumice seed and raise a nursery of trees which will supply, not only himself, but his neighbors and a portion of the public; that he can do this without much trouble or expense and reap a little pecuniary benefit, in fact that he can sandwich this in somehow and somewhere among

his other farm operations and make a little money; he does not care to follow it long and so he gives the subject no thought, no investigation; he goes to little or no outlay in preparation of soil, in drainage, in dressing, in protection, or in transplanting and pruning. What, then, is the natural consequence of this idea followed out in this manner? Just what might have been expected! Failure, and failure of the worst kind; because, not only the owner himself is disappointed, but the public is disappointed and defrauded, and damage of this sort cannot be rectified in a day or a month; it often takes years to recover from the evil effects of setting poor trees, and life is too short to make many such mistakes. 'Tis true, a small house well ordered, is better than a large one badly managed; a little farm well tilled, is more to be desired than a great one sadly neglected, and so, too, a small nursery well cultivated and well pruned, is better than a large one half starved and half neglected; but the trouble is, it is the little ones that are generally half starved and neglected and it is perfectly natural that it should be so. How can the farmer, engrossed with the cares of his farm and busily engaged the greater part of the season in planting, hoeing, haying and harvesting, attend to the wants of the nursery properly? He cannot. The attention which he does give is usually a hap-hazard, go-between one and the results are generally after the hap-hazard style. Ordinarily speaking, then, it is impossible for the farmer to enter into and conduct the nursery business in such a manner as to attain and receive the best results. I am not speaking against the farmer or orchardist raising his own trees, not at all; he can do so if he has the time and inclination, and I should also add, the determination, for it does require pluck and perseverance to raise a good tree.

Well, what then? Shall we give the whole thing up? Oh, no! The case is just here—the majority of farmers and fruit men prefer to buy their trees rather than to raise them. Again, as a rule, that business is the most successful which is conducted on business principles, and who so likely to do this as those who have the means and the opportunity, and where every department is thoroughly understood and equipped? The interest in the fruit business is increasing every year and the demand for trees is increasing in like proportion. I am, therefore, in favor of Maine raising her own trees, if it can be done, and of spending our money in our own State, rather than

of sending it abroad by the thousands of dollars, to enrich some one else. It is no use to say that our climate is unpropitious and that our soil is too hard and rocky; in reality it is not; but suppose it is, that is just where you want to try the trees—under unfavorable circumstances; and if they prove hardy and succeed there, then they will prove hardy and succeed when transplanted. Do you say it is the Baldwin, principally, that is wanted, and it is no use to graft or bud this variety in the nursery? I answer, this is true of the middle and southern sections of our State in regard to what is wanted, but I am not sure that this variety has ever been tested as thoroughly and understandingly as it might have been. I do believe that if this variety was tested on the right kind of soil, rich, gravelly loams, on moderately high elevations, and under the most favorable circumstances of drainage and protection, the results would be successful. At any rate, thousands of good, hardy seedlings might be produced, of proper height and shape to fill the market, while the matter of standard Baldwins in the nursery was being tested in a small way.

If Dr. Hoskins can be successful in raising fruit trees in the high elevations of Northern Vermont, and F. Sharpe & Son successful in producing hundreds of thousands of trees still farther north (though less in elevation), in Woodstock, N. B., why may not Maine nurserymen raise all the trees we want? The banks of the Androscoggin, the Kennebec and the Penobscot are just as well adapted to the business as the banks of the St. John or the regions around Lake Memphremagog. And if the middle and southern portions of our State have not suitable locations to raise those varieties adapted to the Aroostook and other northern counties, then there is plenty of land in Northern Aroostook well suited to the purpose. Then let some active, enterprising young man or company of men take up land there in the right place and go right into the business with the determination to succeed, and I believe their fortunes could be made. There is a growing demand for apple trees in Aroostook. Only a few days ago a prominent man from that section expressed to me his intention of setting out, the coming spring, one thousand trees on his farm, and he supposed he would have to send out of the State for them, as he knew not where he could obtain them within our borders.

Finally, let me point out briefly some of the many things required to be a successful nurseryman here in Maine. The most important

thing of all is to have the right idea at the start. To comprehend the situation in the beginning of any enterprise is a mighty lever, and to fail to comprehend the situation is a mighty drawback. Therefore, to know what the public requires, what kind of trees, how grown and in what quantities, is essential to success. The next thing is to select the right kind of soil. A light sand and a heavy clay must be rejected as unsuitable. Doubtless the very best kind of soil to be selected would be a rich, sandy loam, inclining to clay; but the grand trouble with all such soils is that, generally, they are too low down. A strong, gravelly loam is, on the whole, the best. The location of the nursery is also an important matter; it should never be on low, flat land, nor on the eastern slope of a hill where the snow lies deep; for deep, drifting snows are always damaging. The most suitable location is the top of a ridge or moderately high elevation, protected on the north and west by a forest, if possible; if there be no forest, plant a row of evergreens or build a board fence, for it is absolutely necessary to protect the young trees in some way.

Drainage.

Without drainage, either natural or artificial, it is impossible to raise good, sound, healthy trees. A certain amount of heat and moisture is indispensable to the growth of all plants, but if there be too much moisture, there will be a consequent deficiency of heat and the plants will suffer. We all know that where land is well drained, either naturally or artificially, it can be worked much earlier in the spring for any crop, and that the chances for a successful crop are every way better from its superior condition. The same is equally true when the land is devoted to raising nursery stock.

Transplanting.

It will be impossible, in a paper like this—already lengthy—to discuss this part of the subject properly. It is enough to know that the best nurserymen always transplant their trees, and they invariably do this when the trees are young. The work can be done more rapidly then and with less mutilation to the roots. The advantages of transplanting are, straight lines for cultivation, proper distance apart, more room in the earth for the roots, more breadth in the air for the tops, with better branches and less pruning. The trouble has been that too many of our Maine nurserymen have either not

transplanted their trees at all, or when they did, they have set too closely and the result has been a large percentage of dwarfed and crooked trees. No good nurseryman can afford to lose from twenty to twenty-five per cent in this or any other direction.

Pruning.

To know how to prune is quite an art, that is, to understand the best time of the year adapted to the age and condition of each tree, and whether that tree is a seedling or a graft; and the amount, not too much nor too little, is quite an art, and it is something that must be learned by personal practice in the nursery. To say that seedlings need but little or no pruning in the nursery is a mistake; undoubtedly they will not bear as much pruning as grafts. If all the side branches and spurs were cut off when very young, the tree would probably grow up too slender and willowy; but, again, there is danger, if not pruned at all, that some of the side branches will develop too much and too low down, dwarfing the top and trunk both. I have seen a good deal of this sort of work, or, rather, want of work, and it is high time that a different method be adopted if we are ever to have straight trees and of the proper height.

Clean Culture.

Finally, among the many things to be mentioned as necessary, the last but not least is clean culture. If a perfect nursery is to be established, I don't believe in half-doing anything. Thorough work and enough of it is the best doctrine. To let grass and weeds grow rampant or have any influence whatever in the nursery is a mistake. Some may not agree with me, they may claim that it should be kept down somewhat in the earlier part of the season, but left to grow later and serve as a protection or mulching to the roots of the trees in the heat of summer and cold of winter. I answer, the tops of the trees will shade the ground sufficiently in summer, and if the land is well drained the snows will protect the roots during the winter. In closing, let me say, that if all the conditions of our soil and climate are faithfully observed and carried out, no one need be discouraged or dismayed in attempting to pursue this branch of husbandry, and, furthermore, our farmers and orchardists will not be slow to appreciate such efforts and to give their patronage where it rightfully belongs.

Mr. ATHERTON followed the reading of his paper with some extempore remarks, which led to a general

DISCUSSION.

Mr. SWEETSER. I would like to ask Mr. Atherton how high he would want the heads of the trees if he was going to graft them in the limbs?

Mr. ATHERTON. That depends upon the variety, and whether you are going to keep sheep. If you intend to keep sheep in your orchard, you want tall trees. All people who keep sheep select tall trees, and it is an important point with them.

Mr. SWEETSER. My idea is that there are a great many advantages in having the heads of the trees low—in gathering the fruit and in its falling, particularly. I have one tree of Seek-No-Farther from which I can stand on the ground and gather eight bushels. It bears well and they never drop; and my idea now is that I should prefer low trees. In my first orchard the lowest branches were up six feet from the ground.

Mr. GARDINER. Would it not make a difference in different kinds of trees? Look at the Bellflower. If you have it branch at about five feet, half the branches will droop to the ground. The Northern Spy grows upright, and therefore should be headed low.

Mr. SAWYER. I think it likely that I may say some things which other members will not agree with. But in regard to this matter of raising Baldwins in Maine, I am not ready to admit, from what I have observed and learned, that we cannot raise Baldwins in the nursery in Maine successfully. My own practice has been very limited, but I have never yet found any difficulty. We have had much difficulty with the Baldwin nursery trees in Maine, but I think it will be found that the trees which have troubled us most have been root-grafted. Now I believe that a root-grafted tree is not so hardy as one grafted in the trunk or limbs. I do not doubt that a root-grafted tree will live under favorable circumstances, but it will be subject to injury by the severity of the winter. It may be that the time has come when we can make as good a tree by grafting a scion upon a piece of the root—but I have not seen them yet. I have seen a great many root-grafted trees. I notice there is sometimes a portion of the tree where there is a large excrescence formed of unsound wood, and this is the point from which the suckers start. I have also observed that root-grafted trees are more

inclined to produce suckers than trees growing from the seeds. In regard to the hardiness of the stock. I believe if it is a good practice to leave those spurs on the seedling stock, it is equally good to leave them on the grafted tree. They may be shortened, but ought not to be removed all at once. When you buy trees from a nursery, where the side limbs have been cut off all at once. you will find many suckers growing. It is good practice, then. to leave them on that part of the tree which is to form the permanent trunk, and when you have planted the tree where you want it to grow, to shorten them gradually. I have never had any difficulty by simply controlling the side growth, but I have not made it a rule to cut off the whole until I have got the tree where I want to form a permanent top. I do not see why the same practice is not required in one tree as another. I believe that with proper care, of course employing the conditions which Mr. Atherton has so well described as requisite, as to the soil, and as to the character and vigor of the tree itself, there is no difficulty in raising trees.

I have found it necessary every year to cut away some of the lowest limbs. It seems there is no harm in doing so; but I insist that the tree must have protection from the sun and wind. It was said in the discussion on the cracking of the bark, that the natural condition of a tree is a condition of protection. I believe that the tree needs protection in every stage of its growth, instead of exposure. Your young tree, if trimmed up, has not that protection; and until it can endure exposure and is of good size and growth, it must have protection.

Our friend, Mr. Frost of Monmouth, raises figs successfully every year, but there is no profit in it. He takes his trees up in the fall and carries them into the cellar, just as Mr. Sharp does his apple trees, but we cannot take our orchard trees in for the winter; we have to leave them standing. I do not believe it is necessary to wait till a tree has become large and formed its top, before grafting. I believe you can graft it lower down, and it will grow and form a continuation of the original stock. There was a time in 1855, or thereabouts, when the Baldwins were injured very much throughout the State of Maine, and so, from that day to this, it has been said that the Baldwins were tender; but you may as well say that the white maple is tender, because you don't bring up a cord of wood to your door without finding a black streak in the wood. We have thousands and thousands of Baldwins that have survived the

winters for from a quarter to half a century. I don't believe in that talk about the excessive tenderness of the Baldwin. It is too valuable a tree to allow us to say such a thing.

Mr. ATHERTON. Mr. Sharp's practice of taking up trees would not be practicable for us to follow, he can do it perhaps. And then the matter of setting the trees close together. I think they have an object in view, and put them nearer together for protection and to get all the fruit they can while the trees are young. He told me that he sometimes sent a hundred thousand trees to the West; he has a very large, deep cellar, and so he takes his trees up in the fall and carries them in. These trees, where the side branches were trimmed off, were not more than two years old, so when they are four or five years old the tops are all there. He had the Mackintosh Red, the Duchess, and other varieties, but no Baldwins or Rhode Island Greenings.

Mr. GARDINER. There is one point in the paper which has not been touched upon, and that is in relation to the condition the trees are in when they are brought here. I think it was a very great loss to the State when Mr. E. K. Whitney gave up the nursery business. I had a hundred trees from him at one time, and I don't believe that ever in this State there was a better lot of trees sent out. There was not a root broken or cut; every root the trees ever had was on them. They came in the most perfect order and were set out in a very unfavorable season, and all but two grew.

The reason why so many of the western trees fail to live is because they are brought here in bundles, kept in the open air, and exposed and dried for weeks; therefore, three-fourths of them die.

Mr. BRIGGS. I believe a great deal depends on the selection of apple seeds, whether you get them from the cider mill or whether you save them from good seedling apples.

Mr. GARDINER. I would save them from the seedling apples.

Mr. BRIGGS. I think that is correct, from my experience. I planted a little nursery a year ago last fall, and had seeds enough saved from good apples, but, fearing there were not quite enough, I went to the cider mill and got a few bushels of pomace, and those trees that grew from the selected seeds were twice or three times as large as those that grew from the seeds from the pomace.

In regard to trimming the trees, a man told me that the first class trees from the New York nurseries are trees that are stripped of the leaves as fast as they appear, and the trees that have the spurs

trimmed are second class trees. The first class trees have none of these knots on them. The leaves are stripped off, except a few at the top. Those trees with the knots on them are refuse trees and are trimmed afterwards, and those are the trees they sell to us for first class. I don't believe it makes any difference whether a tree is grown in Maine or in New York, if properly grown and cared for. I think Mr. Atherton is mistaken in saying that the nursery should be screened by a board fence or forest on the west, because the snow blows from the west largely, and it would surely drift over a fence and break down the nursery stock. I have selected, for a little nursery for my own use, a place that has a westerly exposure, and is underdrained five feet deep, so that all accumulation of water is prevented.

In regard to the hardiness of Baldwin trees, the great trouble is the tenderness of the wood. A great many of mine will split down, but other varieties will withstand all the load you can put upon them.

Mr. SAWYER. Is the splitting of the Baldwins in that way in consequence of the tenderness of the wood or the great weight of the fruit upon it?

Mr. BRIGGS. Trees of other varieties will withstand a large weight of fruit where a Baldwin with limbs of the same size will break. I had a great many break this year at the crotches. I think the wood is liable to be soft.

Mr. ATHERTON. I had some trees break in that way, but generally considered that it was because they were so heavily loaded.

Mr. BRIGGS. Exactly; but other varieties that are loaded heavily would withstand the same weight. But, for this latitude, I know no reason why the Baldwin is not a hardy tree.

Adjourned.

SECOND DAY—Morning Session.

The Society met at 9 o'clock A. M., and proceeded to the transaction of the unfinished business of the Annual Meeting.

The Treasurer presented his account for the year ending December 31, 1884, together with the report of the Executive Committee, as follows:

GEO. B. SAWYER, *Treasurer*,

In Account with Maine State Pomological Society.

Dr.

To am't rec'd from the State, bounty of 1883,	$500 00	
" " of life members,	20 00	
" " " annual members,	37 00	
" " of State Agricultural Society,	425 00	
" " from interest, Permanent Fund,	17 20	
		$999 20

Cr.

By balance due Treasurer on account for 1883,	$24 81	
Am't paid orders of Executive Committee,	297 89	
" " Salary of Secretary, for 1883,	100 00	
" " " " 1884,	100 00	
" " on account of printing	25 00	
" " interest on loan,	6 00	
" " balance premiums of 1883,	167 00	
" " on acc't of " 1884,	193 00	
	$913 70	
Balance, cash in the treasury,	85 50	
		$999 20

Statement of the Financial Condition of the Society, December 31, 1884.

Assets.

Amount due from the State, bounty for 1884,	$500 00	
Property owned by the Society, estimated,	150 00	
Extra dividend due from Wiscasset Sav. Bank,	22 36	
Cash in the treasury,	85 50	
		$757 86

Liabilities.

Amount due on loan,		$200 00	
"	" premiums of 1884,	441 00	
"	" unpaid orders,	55 25	
"	" bills not rendered, estimated	50 00	
			$746 25
	Balance,		$11 61

Permanent Fund.

Cr.	By fees of 78 life members,	$780 00
Dr.	To amount on deposit to credit of fund,	344 40
	Balance due fund,	$435 60

Respectfully submitted,

GEO. B. SAWYER, *Treasurer.*

GARDINER, February 24, 1885.

The foregoing account and report was referred to a committee, consisting of Messrs. J. M. Carpenter, L. H. Blossom and W. P. Atherton.

The Society then proceeded to the election of officers for the ensuing year, with the following result:

For President—Charles S. Pope, Manchester.

Vice Presidents—S. R. Sweetser, Cumberland.
Henry McLaughlin, Bangor.

Secretary and Treasurer—Geo. B. Sawyer, Wiscasset.

Executive Committee—The President and Secretary, *ex-officiis*, Andrew S. Sawyer, Cape Elizabeth; Leander H. Blossom, Turner; W. P. Atherton, Hallowell.

Trustees—Androscoggin County, D. J. Briggs, South Turner.

Aroostook	"	E. E. Parkhurst, Maysville Centre.
Cumberland	"	Otis C. Nelson, New Gloucester.
Franklin	"	G. K. Staples, Temple.
Hancock	"	Charles G. Atkins, Bucksport.
Kennebec	"	Richard C. Plaisted, Gardiner.
Knox	"	Elmas Hoffses, Warren.
Lincoln	"	H. J. A. Simmons, Waldoboro'.

Oxford	County,	Jairus K. Hammond, Paris.
Penobscot	"	J. E. Bennoch, Orono.
Piscataquis	"	H. A. Robinson, Foxcroft.
Sagadahoc	"	Henry S. Cary, Topsham.
Somerset	"	James S. Hoxie, North Fairfield.
Waldo	"	D. B. Johnson, Freedom.
Washington	"	Nelson S. Allan, Dennysville.
York	"	Luther S. Moore, Limerick.

Mr. S. L. Boardman, having announced the death of Alfred Smith of Monmouth, a life member of the Society, was requested, by vote of the Society, to prepare an obituary notice for publication in the transactions.

Mr. Gardiner announced the death of Charles Downing, and, after remarks by several members, Messrs. Gardiner, Atherton and Gilbert were appointed a committee to prepare and present appropriate resolutions in relation thereto.

Announcement was made of the decease, since the last winter meeting, of the Hon. John E. Godfrey of Bangor, and F. G. Richards of Gardiner, life members of the Society.

Mr. Boardman, in behalf of the Committee on the Exhibition of Fruit at New Orleans, submitted the following

REPORT.

Your committee to solicit and arrange for an exhibition of Maine fruit at New Orleans, would report that they early organized for the work before them and set about its performance with all the time and ability they could command. During the time of the State Fair at Lewiston, last fall, they made a careful study of the fruit on exhibition, to ascertain who had the finest specimens of certain varieties that could be obtained for the exhibition, taking the names of the exhibitors and the varieties shown. At that time the members of the committee held several consultations, and they also, by appointment, held several interviews with the Commissioners of the State for the Exposition, and with Mr. Ham, the Special National Commissioner. At that time the members of the committee divided the work, and assigned certain details to each to perform. Mr. Pope visited some of the best orchards in the county of Kennebec, and personally solicited the finest specimens he could find; Mr. Prince did the same in his section, and Mr. Boardman also visited

several fairs, where much time was given to the work of soliciting fruit. The committee then had a circular letter printed, containing instructions in regard to the picking, packing and shipping of fruit for the Exposition, which was sent to the leading orchardists in all parts of the State. This was accompanied by two sets of printed postal cards for reply, one to be sent to Mr. Ham and one to the committee, informing them when the fruit was shipped. Printed tags for packages were also sent. These things were done in order that the work of shipping might be uniform, and that as little care to these details as possible might come to the parties sending.

From the lateness of the season—the State Fair was held September 21-24, and the work of sending forward fruit did not begin till some weeks after on account of the holding of the county fairs —it was out of the question to think of obtaining fall varieties. And yet some late fall and early winter sorts were obtained. Cold storage was obtained for the fruit at Lewiston, previous to sending forward to New Orleans, and every precaution and arrangement taken by the committee, with the means at their command, to insure safe keeping and rapid transportation. In addition to the printed circulars above referred to, many private letters were written soliciting specimens, and personal visits made to fruit growers. The results of this work were that the committee received responses from twenty-nine individuals, who contributed twenty-seven barrels and ten boxes of fruit, and one specimen of evaporated apple. Kennebec County sent the largest number, viz: sixteen barrels. The others came from Androscoggin, Cumberland, Franklin, Somerset and Sagadahoc counties. A list of the individual contributors, with the varieties sent by each, is here given:

W. P. Atherton, Hallowell, four barrels: comprising Baldwin, Roxbury Russet, Northern Spy, Tompkins King, Red Canada, Talman Sweet, Ladies' Sweeting, Newbury Sweet, Wagener, Winthrop Greening, Nodhead, Danvers Winter Sweet.

Hon. G. H. Andrews, Monmouth, one barrel: Baldwin, Black Oxford, Roxbury Russet, R. I. Greening.

Andrews & Peacock, Gardiner, one barrel: Northern Spy, Black Oxford, Peck's Pleasant, Hubbardston Nonsuch.

J. O. Butman, Readfield, one barrel.

D. J. Briggs, South Turner, one barrel: Baldwin, English Russet, Talman Sweet, Wagener, Northern Spy, R. I. Greening, Tompkins King.

Henry S. Cary, Topsham, one barrel: Baldwin, R. I. Greening, Talman Sweet.

J. Colby Dudley, Readfield, one barrel: Baldwin, Northern Spy, R. I. Greening, Red Canada, Hubbardston, Nodhead, Jewett's Red.

Hon. R. H. Gardiner, Oaklands, Gardiner, four barrels: Bellflower, Hubbardston Pippin, Gloria Mundi, Talman Sweet, Northern Spy, Nodhead, Richard's Graft (Strawberry), Fameuse (Snow), Ribston Pippin, Blue Pearmain, Hunt Russet, Black Oxford, Tompkins King, Hubbardston Nonsuch, R. I. Greening.

Hon. Z. A. Gilbert, North Greene, Milding.

C. H. George, Hebron, one barrel: R. I. Greening.

Nathan W. Harris, Auburn, Wagener.

A. L. Hersey, Oxford, Maiden's Blush.

D. H. Knowlton, Farmington, three barrels.

E. A. Lapham, Pittston, Black Oxford, Tompkins King.

H. T. Leech, Monmouth, Roxbury Russet, Baldwin.

T. S. McLellan, Brunswick, Wealthy.

C. A. Marston, Skowhegan, one barrel: Northern Spy, Tompkins King, Gray Pearmain, Black Gilliflower.

M. J. North, one box containing one-half bushel.

Hiram Pope, Gardiner, Hunt Russet.

Hon. Rufus Prince, Turner, one barrel: Black Oxford.

J. Pope & Son, Manchester, two barrels: Baldwin, Talman Sweet, Danvers Winter Sweet, Winthrop Greening, Gravenstein, Maiden's Blush.

Harrison Parlin, East Winthrop, Winter White.

Albion Ricker, Turner, one barrel: Tompkins King.

S. R. Sweetser, Cumberland, one barrel: Northern Spy, Jewett's Red, Tompkins King, R. I. Greening, Red Russet, Baldwin, Red Canada, Roxbury Russet.

Arthur S. Taber, Vassalboro', one barrel: Starkey, Golden Ball.

Miss L. L. Taylor, Belgrade, one barrel: Hubbardston Nonsuch, Northern Spy, Sweet Russet, Tompkins King, Blue Pearmain, Baldwin, Mother, R. I. Greening.

J. J. Towle, Carthage: one box evaporated apple.

W. R. Wharff, Gardiner, Black Oxford, Tompkins King.

A. F. Williams, one barrel.

After the committee had received all the notices which were reasonably expected, Mr. Pope went to Lewiston and gave his

attention to the work of shipping. The fruit was sent forward about November 20. Finding it was necessary to have some one to attend to the placing of the fruit on exhibition, and not having the means to pay a person for their service, Mr. Pope, who had decided to visit the Exposition, volunteered to take charge of the fruit at New Orleans, and place the same on exhibition. He left Maine December 2, and arrived at New Orleans December 28. The history of the Exposition is too well known to be repeated here. There was delay in all the arrangements—delay in opening the buildings to the public, and when opened nothing was in readiness. It is but just to state, however, that our Commissioner, Hon. J. B. Ham, proved one of the most efficient officers at the Exposition, and did all in his power—which was a great deal—to aid the work of the Maine exhibitors. When Mr. Pope reached New Orleans he found the refrigerator room incomplete, and our Maine fruit yet unloaded from the car, out of doors, in the warm January temperature of the Crescent City. Concerning the fruit, Mr. Pope says: "The apples arrived in good condition, but after staying three weeks in the heat, they had begun to decay some when they were ready to be placed on the tables." It was found that the examining committee would not see them as soon as they were placed upon the tables, as promised, but, like everything else there, they were two weeks behind with their work. Consequently, arrangements were made to have more taken from the reserve in the refrigerator at the time, and replace those that were decayed. The refrigerator was only such in name, as the cold air had not then been introduced; and when opened the apples were about half rotten. A peck or a half bushel of each variety of our leading winter sorts, which were in good condition, were then placed on the tables in Horticultural Hall; and a display in quantity was also made in the Maine State Exhibit in the Government Building, the last named being of the leading winter varieties, for shipping. Our fruit compared well with that from California, Michigan, Wisconsin and some other States; and upon the whole, although much disappointment was the result of the exhibit, it was no greater than came to other exhibitors from other States and in other departments, and from this fact we gather a little consolation. We also feel sure that a point has been gained by the Pomological Society in making known the superior shipping qualities of Maine late-keeping apples, by this exhibit; and while it may not have yet commenced to show results, we feel that it will

in the future. At any rate, since this Convention has been held in Gardiner, a cablegram has been received direct from Liverpool, by a Gardiner orchardist, giving quotations of apples in that market, in which Maine Baldwins are placed higher in price than those from New York or Canada.

Your committee cannot close this report without a word of praise to Hon. J. B. Ham for his earnest efforts in aiding their work, and his readiness to do anything in his power to help on their mission. Here and at New Orleans, both, Mr. Ham was ever ready to second our plans, and help carry forward their accomplishment. Thanks are also due to each person who so kindly responded to our invitation to send fruit; and especially to Hon. R. H. Gardiner, for his kindness in writing to personal friends in New Orleans in our interest. And as chairman of the committee, I wish personally to thank each gentleman associated with me for their uniform courtesy, and I beg to say that my thanks, and those of the Society, are especially due to our President, Mr. Pope. my associate, for his earnest personal efforts in this work. To him, more than to any one else, is due whatever of praise or credit belongs to your Committee on the Maine Exhibit of Fruit for the New Orleans World's Exposition.

Respectfully submitted.

SAMUEL L. BOARDMAN,
For the Committee.

The report was accepted, with a vote of thanks to the committee for their services, and to the several contributors to the exhibition.

The following paper was then read by the President, the writer of it not being in attendance:

COMBATTING THE ROUND-HEADED BORER.

By CHARLES G. ATKINS of Bucksport.

One of the first observations I had occasion to make about the round-headed borer in my apple trees, was that the eggs were laid in the bark so near the surface of the ground (if not, indeed, sometimes just below it) that as soon as the young borer began to work, all external traces of his presence would often be concealed from view by the earth or the grass-roots. To ensure effective work, it was necessary to dig away a little of the rubbish and dirt and scrape the bark clean. I always did this myself and enjoined the practice upon my hired help. The necessity of replacing the dirt after oper-

ating did not at first suggest itself, and so we kept on, year after year, removing a little of the dirt, perhaps not over half an inch yearly. In a few years we had thus formed a depression all about the collar of the tree, and in many cases the roots had been laid bare. The beetles continued to lay their eggs close to the depressed surface, and it became yearly more difficult to find and extract the borers. Not only would many escape detection, but when the outlet of an excavation was deep in the basin, and the gallery ran upwards, it was very difficult to insert a wire and drive it home. When they got down so far as to work under the roots, then it was quite a hopeless job. At the same time, experience had led to the conviction that if the borer beetle could be induced to lay her eggs high enough on the trunk, the detection and destruction of every egg or larva in an early stage of growth would be, on smooth-barked trees, a comparatively easy matter for a man with good eyes and patient disposition. The mother beetle makes a perpendicular slit in the bark, which, after drying, shows as a ragged-edged gash one-quarter or three-eighths of an inch long, and beside this is a very slight swelling in the bark, beneath which lies the leathery-skinned egg, under the bark and next the wood, if the bark be thin, but if the latter be thick, then beneath its outer layers. Press with your knife handle or the flat of the blade on the bunch and you will hear the snap of the bursting egg. This is the condition of things during the latter part of the summer. In early autumn you can find the young larva by the same mark, and it is not until a year has passed after the laying of the eggs that the borer gets far away from his cradle. Some time during this first year he ought to be found and destroyed; and the earlier the better, for, according to my observations, the period of his greatest mischief is when he is about a year old, say in June and July.

What are the means of compelling a borer beetle to lay her eggs high on the trunk? Probably a close wrap of cloth, cedar bark, tin or stout paper would do it, but I have been warned that these preventives have sometimes led to disappointment, the beetle getting in behind them. Besides, it must be a good deal of trouble to put them about the trees and remove them again for examination. I could think of nothing that promised so great efficiency combined with economy, as a little mound of sand. Any kind of dirt would do as well as sand, were it not for the liability to be pushed away on all sides by the swaying of the tree in the wind and packed so as to

leave an open space all around the trunk for the beetle to crawl down into. Loose sand will not pack, but if the tree sways will, as soon as it returns to its natural position, settle in and fill the gap.

A mound some six inches high, applied just before egg-laying, would compel the beetle to work above it, and later in the season, if it did not settle away sufficiently to permit thorough examination, it could easily be pawed away. I accordingly had nearly all my young trees mounded with sand in 1884. The date of application is a point of considerable importance. It should be before the beginning of egg-laying, and should be delayed as late as is safe, to permit of repeated examinations. The middle of June was fixed as the date beyond which it would be unsafe to delay the mounding. Soon after that, as near as I can conclude from limited data, the egg-laying begins. How long it continues is uncertain, but as I have found unhatched eggs after the first of September, it is probable that it continues till late in August. Therefore, the mounds should be kept well up till about the end of August. After that, they may safely be drawn away or suffered to sink down as they would naturally, under the influence of the rains, and need not be drawn up again about the tree until the next June. As the sand works away and wastes in the grass it may be renewed, but a liberal application will answer for several years. If sand be scarce it may be economy to place an old tomato can loosely around a small tree and fill it with sand, as recommended by Dr. True several years ago. Wraps of paper extending two feet up the trunk, tied on tight and left there the whole year may be found to be an effectual protection against both borers and mice, but I have not tried it. Tarred paper would be most durable, but injury to trees has been reported from its use, and until these reports can be shown to have been unfounded, it should be used with great caution.

So far we have considered only the young trees with smooth bark. On old, rough-barked trees the mounding would assist somewhat, but the condition of the bark would still make it difficult to find the borers. Such trees, I am sorry to say, I have thus far neglected, and perhaps to this circumstance I owe it in part that borers have been plentier in my orchards during the past two years than ever before. I propose now to take these cases in hand, and the first step will be, after a moderate application of sand, to apply an offensive wash to these trunks for, say, two feet from the ground.

The virtue of such applications is disputed by some, but there is so much testimony in their favor that I have great hope of success. I find many recipes in the papers and in my scrap-books. One that has a promising look is a kerosene emulsion, described in the Rural New Yorker as being used by the orange growers of Florida. It is made as follows: "Formula:—common or whale-oil soap, half a pound, dissolved in one gallon of boiling water; add two gallons of kerosene and churn while hot. In using, dilute with ten parts water. This makes thirty-three gallons of solution at a cost of one cent per gallon, where you have cheap kerosene." This mixture I have already used for spraying lousy trees, and apparently with success. I would apply it, perhaps double strength, to the trunks of trees by means of a hand force-pump, about June 15, July 1 and 15. Another application, recommended by Prof. Cook of the Michigan Agricultural College, is compounded as follows: "Dissolve two quarts of soft soap in a gallon of water. Heat this till it commences to boil, then remove from the fire and at once add one pint of crude carbolic acid. Stir well and keep in a close vessel. To apply this," says Prof. Cook, "I have found a common shoe or blacking brush, one with the handle diagonal to the body of the brush, most excellent. The use of these substances is to prevent the beetle from the work of egg-laying, and as the obnoxious odor of the carbolic acid mixture is very persistent, it retains its virtue longer than does the soft soap where used alone." I would prefer to dilute Prof. Cook's solution until it could be applied through a force pump. Remedies of this class have been often recommended, and they have been discussed in the meetings of the Pomological Society, but I think there is yet a lack of exact knowledge on the subject, and that it presents an excellent field for study and experiment.

In the first hunt for the borer, I employ a sharp knife and a wire or a narrow piece of spring steel; mallet and chisel, never. If the borer has penetrated so deep that he cannot be reached by the wire, it is sure that he has done nearly all the harm he is capable of, and it is much better to let him alone than to mutilate the tree badly. I have not yet found a pair of eyes sharp enough to discover every trace of a borer the first time, and therefore never trust to one examination a year. I have always two thorough canvasses, and generally three, and would prefer even four, two between August 1 and October 20, and two between May 1 and June 10.

In closing, I will venture the suggestion that preventive measures are not in all cases the best to adopt, and that the deposition of the borer's eggs is a case in point. Provided we have a plantation of young trees protected at the very base by mounds or other means, it is better to let the beetles lay their eggs in the smooth stems, where we can destroy them, than, by extending our preventive measures to the whole stem, compel them to resort to the limbs, where it will be more difficult to find them, or even drive them across the road into a neighbor's plantation, whence in a few years their numerous progeny will return to vex us.

DISCUSSION.

The discussion of the subject of Mr. Atkins' paper was extended to considerable length, occupying the remainder of the morning session. It brought out but few points of interest in addition to the common stock of information on the subject, and the report is condensed accordingly.

Mr. CAREY objected to the use of tarred paper around the trunks of trees; and related instances in which it had caused injury to the bark, especially on young trees.

Mr. ATHERTON thought, from his experience, that the borers commence to lay their eggs earlier than stated by Mr. Atkins. He had no doubt they commenced in May in some localities, and again in August and September.

Mr. BRIGGS advised examining the trees twice in every season—spring and fall. He agreed with Mr. Atherton in respect to the time when the borers deposit their eggs. Thought the earth should be replaced around the tree after the examination, and recommended preparations of carbolic acid for repelling the borers and for other beneficial uses about the trees.

J. C. DUDLEY, of Readfield, said he had had but little trouble from this species of borer, but more from another species working up around the limbs. Recommended washing the trees with soap, and scraping.

Adjourned.

AFTERNOON SESSION.

Met at 2 o'clock P. M.

Voted, That a selection of specimens of the fruit on exhibition be made and forwarded to the Massachusetts Horticultural Society; and Messrs. Blossom, Sweetser and Briggs were appointed as a committee for that purpose.

The following paper was then read, the author remarking that he had omitted considerable portions of the paper as originally prepared, on account of similar matter having been presented in the papers previously read at this meeting:

SOME DEFECTS IN ORCHARD MANAGEMENT.

By L. H. Blossom, of Turner.

What are the chief defects in our present system of orchard management? This question embraces a large field for discussion, and I shall attempt to touch upon but a few of the most important points.

In conversation with a noted farmer of our county, a short time since, I asked him if he was going to attend the pomological meeting at Gardiner. "Well," said he, "I don't know; what are you going to talk about down there?" "Oh," I replied, "we are going to try to learn something new about fruit raising, if we can." "Well," he replied, "if that is what you are going to talk about I shall stay at home. The fruit question is all worn out, has been talked to death, and is worn threadbare, and getting monotonous. No, I shan't go. I know all I want to about fruit raising now. It's all a humbug and I won't go." With that we parted.

Now, Mr. President, I know the subject is an old one, yet an ever new one. It has been written upon, been talked about, and studied upon by hosts of pomologists all over this broad land of ours, and the end is not reached yet. We are still somewhat in the dark in regard to several of the most important questions of fruit raising, and I hope to see them well discussed before the end of this meeting. In the hope of bringing out that discussion, I will mention some of the most prominent defects in the management of our orchards. And first among those I shall mention will be the size and age of our fruit trees when set in the orchard. For me, I want a three-year-old tree, at least not over four years old, and

from four to six feet high, and in diameter at the top of the ground, from one inch to one and a half inches, well rooted and the head low down. Give me such a tree as this, and a good, rich, strong, rocky soil to set it in, and when well set out in its proper position, I believe the fight is well begun and the battle half won. I remember last season I was passing by a newly set orchard, and the trees looked so much different from most of the newly set trees that I took the liberty to go and examine them; and while so doing, the owner put in an appearance, and in conversation with him I found that those trees were selected according to his own peculiar ideas of a tree fit to set in the orchard. They were from six to eight years old in the nursery, the bases of the trees were from one and one-half to two and one-half inches in diameter, and the tops were six feet from the ground. The tops had been cut off from year to year, and new shoots starting out, the trees had made from twelve to sixteen inches of new wood the last year they stood in the nursery. I asked him why he purchased that style of trees. He said he believed in starting right, and that it was cheaper to set trees of a bearing size and age, even if you had to pay from five to ten cents more for them than you did for these little three-year-old shoots. Now, I believe that that man committed a grave error at the start.

I want to say a few words about those insects injurious to the young trees, of which there are many. Among the most destructive, I will mention the borer, the louse, and the different species of caterpillar, against which we have got to keep an ever-watchful eye, or the error will cost us our orchards in the end. I think the worst of all the insects I have mentioned, the one that has cost the orchardist more than all the rest put together, is the borer, and how best to dispose of him is a conundrum not yet fully solved. Some recommend a solution of barn manure and water with a liberal sprinkling of Paris Green, made of the consistency of a thin paste, and with an old broom paint the butt of the trees from the ground up a foot or more. While this may act as a preventive to a certain extent, it is not safe to depend wholly upon this remedy, as a heavy shower or two will wash the most of it off. The best remedy I have found yet is the knife and wire.

Again, what is the best method of thinning the fruit on too heavily bearing trees? We often hear the complaint of trees over-bearing, and the fruit being small and poor. Now to such I would say, go and give your orchards something to eat, something from which

the trees can make good fruit of; then prune your trees out so the sunlight can enter and ripen the fruit. I don't believe in thinning out the fruit and leaving twice as many branches as ought to be on the tree, but prune intelligently and I think the fruit will be all right.

Of one more pest I wish to speak, and then I will close. That is the apple maggot. This little insect is, comparatively speaking, a new comer, and we all should study how best to receive him, and also how to get rid of him. We find them most common in our early fruits, in sweet apples especially. I know of some orchardists, when they find their fruit infested with the maggot, who leave the fruit on the ground to decay, which is most decidedly wrong. My experience with this pest in my orchards has been confined to two varieties of sweet apples—one a fall apple, the other a winter apple. I first discovered them three years ago in the early fruit, and two years ago I discovered them in the winter variety. My method of treatment has been this: To gather the fruit as soon as I discovered them in the apple, cook the apples and then feed them to the hogs. In this way I believe we can exterminate this most dangerous pest. In fact, it worked so well that in the case of the winter sweet apple I failed to find one of them infested with the maggot at the time of harvesting last fall. So I put them in the cellar and used them as we wanted until gone, without finding one affected. If any one has a better mode of disposing of them than mine I want to know what it is.

The Committee on the President's Address presented the following

REPORT.

The committee appointed to consider the address of the President beg leave to report: First, that they approve of his suggestion of the desirability of teaching horticulture in our schools, and that to aid this, public lectures be delivered from time to time by prominent men versed in the subject. Second, the suggestion in the address upon the manner of packing fruit is an important one, and they recommend that it be taken into consideration by all our fruit growers and fruit dealers; for the reputation which we have already established in the European market is an excellent one, second to that of no other country, and it is very desirable that this reputation be not only sustained, but be still further advanced by

honest packing and reliable branding. Maine fruit can stand on its own merits.

And the committee still further recommend another suggestion—a more general interest in the work of our Society which has done so much for the cause of pomology in the past, by the individual and united action of every member to solicit and encourage others to join our numbers.

Report accepted.

The Committee on New Fruits presented the following

REPORT.

The committee express their thanks to the several exhibitors for the interest they have taken in presenting specimens to the notice of the committee; and while recognizing the delicacy of their position with reference to the individual tastes and opinions of the exhibitors, they have endeavored to discharge their duty according to the best of their ability and judgment.

While the committee recognize the desirability of introducing and propagating new varieties of first-class quality, they would discourage the introduction of those of inferior or ordinary quality, so long as we have so large a number of good varieties already well known in the markets.

The following are the principal varieties to which our attention has been called:

Cooper's Market. Specimens presented by A. E. Andrews of Gardiner. Size medium, color red. A late keeper and good for cooking. Cannot be recommended, as we already have enough of that class.

Mann Apple. Exhibited by D. J. Briggs of Turner. Fruit coarse in texture and inferior in quality. Not to be recommended.

McIntosh Red. Exhibited by Orrin McFadden of Dresden. Size medium, color and quality good.

Norton's Melon. By W. R. Wharff of Gardiner. Size large, splashed and striped with red. Quality good, not best. Lacks firmness of flesh.

Ontario. Shown by J. Pope & Son and G. B. Sawyer. Fruit of good size. Yellow, splashed and slightly striped with red. Flesh slightly coarse. Quality good, rather acid. Specimens a little past their season.

Specimens exhibited by E. W. Dunbar of Damariscotta. Generally conceded to be the Westfield Seek-No-Further. Past the season, so that the quality could not be determined.

Russets. Exhibited by C. G. Atkins and grown by E. G. Colby of Bucksport, from New York trees. Evidently the so-called American Golden Russet of Western New York, and not the true American Golden Russet or Bullock's Pippin.

Specimens of a seedling sweet apple, grown and exhibited by C. H. Page of Winthrop, who considers it a superior baking apple. The committee do not regard it as of sufficient merit to warrant its propagation.

Specimens by H. B. Williams of Sidney. Tree bought from a New York nursery for R. I. Greening, but not true. Of large size, good for cooking.

Seedling by S.B. Friend of Winthrop, who says: "It originated in Winthrop. Tree, hardy. A profitable market variety, keeping till May." Specimens past their season, but so far as we could judge of it we have many better varieties, and cannot recommend it.

Report accepted.

The Committee on the Exhibition of Fruit at this meeting submitted the following

REPORT.

The exhibition is remarkable for the uniform excellence of the specimens and the general good character of the varieties exhibited. Nearly all the specimens are in a state of most perfect preservation, and afford additional proof of the late-keeping quality of Maine apples.

We have indicated the best three collections in their order, and, excluding these from further competition, have indicated the best collections from each of the several counties from which there is more than one collection, in the same manner. We have also indicated in some instances the best and second best dishes of the principal varieties.

The three best collections are:

First. S. R. Sweetser, Cumberland Centre, nineteen varieties, viz:

Baldwin,	Ben Davis,
Northern Spy,	Hurlbut,

Hubbardston,
Red Russet,
Roxbury Russet,
R. I. Greening,
Red Canada,
Rambo,
Jewett's Red,
Spitzenburg,
Yellow Bellflower,
Wagener,
King of Tompkins County,
Newtown Pippin,
Westfield Seek-No-Further,
Three varieties Unknown.

Second. Miss Alice Foster, Gardiner, eighteen varieties:

Baldwin,
Yellow Bellflower,
Fameuse,
Fall Harvey,
Gravenstein,
Jersey Greening,
R. I. Greening,
Hubbardston,
Minister,
Mother,
Nodhead,
Ribston Pippin,
Roxbury Russet,
Golden Russet,
Talman Sweet,
Holmes Sweet,
Richards Sweet,
Ladies' Sweet.

Third. W. R. Wharff, Gardiner, fourteen varieties:

Hubbardston,
Norton's Melon,
Northern Spy,
Golden Russet,
Winthrop Greening,
English Russet,
Ribston Pippin,
Yellow Bellflower,
Roxbury Russet,
R. I. Greening,
Black Oxford,
Wine Apple,
Hubbardston Pippin,
King of Tompkins County.

ANDROSCOGGIN COUNTY.

First. D. J. Briggs, South Turner, nine varieties:

Talman Sweet,
Northern Spy,
Black Oxford,
Baldwin,
King of Tompkins County,
Fall Pippin,
English Russet,
Roxbury Russet,
One variety Unknown.

Second. L. H. Blossom, Turner, eight varieties:

Baldwin,
Black Oxford,
Northern Spy,
Cooper's Market,
Talman Sweet,
Roxbury Russet,
Spitzenburg,
R. I. Greening.

KENNEBEC COUNTY.

First. J. M. Carpenter, Pittston, thirteen varieties:

Winthrop Greening,
Blue Pearmain,
Nodhead,
Fallawater,
Roxbury Russet,
R. I. Greening,
Northern Spy,
Pittston Beauty,
Yellow Bellflower,
Talman Sweet,
Golden Russet,
Danvers Winter Sweet.

Second. E. A. Lapham, Pittston, sixteen varieties:

Talman Sweet,
Yellow Bellflower,
Northern Spy,
Ribston Pippin,
Hubbardston,
Roxbury Russet,
Baldwin,
R. I. Greening,
Gravenstein,
Peck's Pleasant.
Fall Pippin,
Ben Davis,
American Golden Russet,
Winthrop Greening,
Two varieties Unknown.

Third. E. G. Hooker, Gardiner, fourteen varieties:

Northern Spy,
Yellow Bellflower,
One variety Unknown,
R. I. Greening,
N. Y. Steele Baldwin,
Winter Sweet,
Russet,
Spice Sweet,
Talman Sweet,
Hubbardston,
Roxbury Russet,
Ribston Pippin,
Winter White,
Peck's Pleasant.

A. E. Andrews, Gardiner, eight varieties:

Yellow Bellflower,
Peck's Pleasant,
Hubbardston,
Red Canada, *Best.*
Northern Spy,
Roxbury Russet,
Talman Sweet,
Cooper's Market,

J. Pope & Son, Manchester, nine varieties:

King of Tompkins' Co., *Second.*
Baldwin,
Fallawater,
Talman Sweet,
Ontario,
Peck's Pleasant,
Mother, *Best.*
Starkey,
Minister.

J. R. Peacock, Gardiner, ten varieties:

Yellow Bellflower,	Black Oxford,
Talman Sweet,	R. I. Greening,
Vandevere,	Nodhead,
Roxbury Russet,	Northern Spy, *Best.*
Hubbardston,	Colvert.

R. H. Gardiner, Gardiner, ten varieties:

Yellow Bellflower, *Best.*	Peck's Pleasant,
Northern Spy,	Ribston Pippin,
Blue Pearmain,	Talman Sweet,
Baldwin,	Fameuse,
Richard's Graft (Strawberry),	Porter.

S. R. Lapham, thirteen varieties:

Baldwin, *Best.*	Talman Sweet,
Hubbardston,	Ben Davis,
R. I. Greening,	Late Strawberry,
Roxbury Russet,	Porter,
Golden Russet,	Three varieties Unknown.
Yellow Bellflower, *Second.*	

Augustus Jordan, Gardiner, one variety:

Yellow Bellflower.

George Woodworth, four varieties:

Yellow Bellflower,	R. I. Greening,
Talman Sweet,	One variety Unknown.

John O. Willey, six varieties:

Hubbardston,	Yellow Bellflower,
Roxbury Russet, *Second.*	Talman Sweet,
Baldwin,	Red Canada.

Charles H. Page, Winthrop, four varieties:

Jewett's Red,	Hubbardston,
Yellow Bellflower,	Peck's Pleasant.

LINCOLN COUNTY.

First. G. B. Sawyer, Wiscasset, seventeen varieties:

R. I. Greening,	Peck's Pleasant,
Hurlburt,	King of Tompkins County.

Vandevere,
Ontario,
Fameuse, *Second.*
Winthrop Greening,
Starkey,
Lyscom,
Hubbardston,
Baldwin,
Northern Spy,
Danvers Winter Sweet,
Three varieties Unknown.

Second. Henry Ingalls, Wiscasset, nine varieties:

King of Tompkins County,
Wagener,
Mother,
Yellow Bellflower,
Northern Spy,
American Golden Russet,
Swaar,
Danvers Winter Sweet,
Bottle Greening.

E. W. Dunbar, Damariscotta:

One variety, Unknown.

Orrin McFadden, Dresden, four varieties:

McIntosh Red,
Wagener, *Best.*
Western N. Y. Russet,
Northern Spy.

FRANKLIN COUNTY.

G. K. Staples, Temple, fourteen varieties:

Peck's Pleasant,
Golden Russet,
Colvert,
King of Tompkins County,
Twenty Ounce,
Baldwin,
Northern Spy,
R. I. Greening,
Seek-No-Further,
Hubbardston,
Rambo,
Talman Sweet,
Mann Apple,
Derry Pippin.

HANCOCK COUNTY.

C. G. Atkins, Bucksport, seven varieties:

American Golden Russet,
Hunt Russet,
Roxbury Russet,
Russet,
Russet,
Jonathan,
Russet.

Mrs. M. E. Thomas, Rockland, one parlor bouquet.
Miss Sophronia Hopkins, Gardiner, one pot plant (Primrose).
Miss L. M. Pope, Manchester, cut flowers in baskets.

Several other contributions were received after the list of entries was made up and our examination had been completed.

Report accepted.

Letters were read from the following absent members and others, viz:

Granville Fernald, Bridgton, formerly Corresponding Secretary.

Mrs. M. E. Thomas, Rockland, accompanying a bouquet of flowers.

S. R. Leland, Farmington.

Dr. J. A. Morton, Bethel.

F. E. Nowell, Fairfield, Member of Executive Committee, detained by sickness.

Henry S. Smith, Monmouth, announcing the recent death of his father, Alfred Smith.

S. W. Shaw, Minot.

C. G. Atkins, Bucksport.

EXTRACTS FROM LETTERS.

Granville Fernald—"Although not now actively engaged in the cultivation of orchard fruits, I am by no means an uninterested reader or observer of the evidences of improved modes of fruit farming; and I fully believe in the important mission of the Maine State Pomological Society. It is a great educator, and whoever comes in contact with it receives light and stimulus to aid in building up the rural industrial fabric, and developing to all needed uses and extents the wonderful native resources of our soil and climate. In my travels, I have observed in every place unmistakable proofs that the influence of our State Society has reached the remotest parts of the State."

S. W. Shaw—"I am an invalid this winter and shall not be able to attend our meeting at Gardiner, to-morrow, as I would be very glad to do. I trust the time will be fully and profitably occupied, awakening an increased interest in the work of the Society, and adding materially to its permanence and future success. Without attempting to write a formal paper for the occasion, I will simply invite attention to some facts and considerations, which I hope may, in some way, be brought to the attention of the meeting.

It is well understood that nearly all farm products have sold since the last harvest at very unsatisfactory prices. In many cases the

home markets became almost wholly glutted. Over-production is doubtless a partial cause for this state of things. Outside competition is also a matter of concern to us, of which we are likely to have more in the future.

Under this state of things the apple is assuming a preeminence over almost every other crop sold from the farm. Since the opening of the shipping season a brisk demand has sprung up at remunerative prices, shippers taking them at the homes of the growers. They are now paying two dollars per barrel for Baldwins in fair condition.

The foreign market is almost certain to improve as our people become better acquainted with the best methods of harvesting and caring for the crop, preparatory for the market. Reports of sales in England indicate that the superiority of Maine fruit is there becoming better understood. In Boston, Maine apples, for shipping purposes, are quoted twenty-five cents per barrel higher than Massachusetts fruit, all going to show that whatever crop fails to find a satisfactory market, the apple, in the future, is not likely to be one of that class. The proper selection of varieties demands careful consideration. In Androscoggin County that matter is taking care of itself. Shippers prefer and take all Baldwins offered, while other varieties are taken sparingly. Consequently, the Baldwin, for that reason, as well as from its adaptability to different soils and its productiveness, is the general favorite here.

The question, Who should raise apples? also demands attention. Not every one, certainly, who owns land should undertake it largely, though every owner of only one acre should cultivate a few trees. Orchards will not flourish on some soils—some locations are unfavorable to their growth, and he should let orcharding alone who has no faith in it and regards an apple tree as an unsightly thing or only as a cumberer of the ground."

The remainder of the afternoon session was occupied with a

DISCUSSION OF VARIETIES.

Mr. GILBERT, being called upon to open the discussion, said: I hardly know what branch of work, in regard to the fruit lists, you would like to take up. It hardly seems to me possible or necessary that we should take it in order, and make an examination of the entire list. There are some varieties urged upon our attention

which are not generally well known and which, it seems to me, that it might be well to discuss, in order to find their merits and demerits. The *Alexander* is still attracting some attention. I have learned something in regard to it, during the past year, from inquiry as to the demand for it in the market; of course that affects the desirability of the fruit. It certainly appears to be undesirable for some sections of the State. Being in Portland last fall, and studying, of course, the fruit stands and the fine show of fruit made, I saw, on nearly every stand in the city, large dishes, and sometimes counters, filled with the Alexander. It makes a very fine show and attracts attention. I asked the proprietor of one of the stands in regard to it, and if they had a good sale for it. Said he, "No, we buy about one bushel and keep them for show. It is not an apple that sells." If this is the appreciation of the market in regard to the apple, certainly we do not want it as a market fruit. It is classed, of course, with cooking apples, but I have no sympathy with an apple that is only a cooking apple, because it sells for a low price. We have the Alexander, Twenty Ounce, Duchess of Oldenburg and Colvert, which are all of the same nature, and while good, rich apples sell at $2.00 per barrel, these sell at $1.00 or $1.25. It costs no more to raise good apples than poor ones. I know of no reason why we should recommend these cooking apples to the public attention. There is no room for them in any section where better apples can be grown, and I would include the Alexander in this list. It is, in the northern section of the State, a richer and better apple than when grown on the coast, but it is not wanted in the central and southern parts of the State.

If, Mr. President, you have not a list of such fruits as you wish to take up, I would then call up the *McIntosh Red*, referred to just now by the committee.

Mr. Blossom. I will say, in regard to that, that I have two trees in bearing, which probably bore last year one-half barrel of apples, and I failed to find one that was eatable. they cracked as badly as the Flemish Beauty pear, and were all spotted and very inferior in appearance. I wish I could raise as good specimens as those here on exhibition.

Mr. Carpenter. Mr. McFadden of Dresden, who exhibits it here, has one tree of it standing in a favorable situation, east of the Kennebec River, and he speaks very highly of it.

Mr. GILBERT. I have been compelled to investigate this fruit somewhat. It has been offered for sale, and pressed very earnestly to the attention of our fruit growers; and, in order to make it especially attractive, an extra price has been put on the trees; and, being frequently consulted in regard to the merits of the fruit, I have felt compelled to learn what I could in regard to it, and, that I might be certain in regard to the apple and that it was correctly named, I sent to Dr. Hoskins of Newport, Vermont, for samples of the fruit. He very kindly sent me some, carefully packed, and the apple now set before us for examination is the same variety of fruit. It is, without question, the McIntosh Red, and the gentleman from Turner says that if he could raise as good fruit as that, he would like to raise it. Now I would ask him, what for? Has he really considered the reason, and whether he does want to raise it, or not? In the first place, what are the characteristics of the apple? Let us be careful that we study it aright, and find out all about it. The tree is hardy, and the indications are that it is a good bearer. It is one of that family of fruits which is called the Fameuse family, and our fruit growers know what that means. It has the characteristics of the Fameuse; and those are, soft flesh and thick, tough skin, and every one of these varieties is subject to this mould, which attaches itself to the Fameuse, and especially so on high lands. The Wealthy and the Bellflower are also grown better on low lands. If you have such land, and feel that you must grow fruit on it, you can introduce this variety. The quality is very good indeed. The indications are that it is not a late keeper—it may carry well till the middle of winter. You will find that, as it becomes soft, the skin will pull away from the fruit very easily, and the pulp will become soft while the skin is firm. The fruit is soft and does not handle well; it bruises easily, like the Bellflower, and it has to be handled with extreme care. It may be desirable to have it for home use, but for a staple product, and to fill this great demand which we are all aiming to meet, it does not possess those qualities which will enable it to be handled to so good advantage as the old standard Baldwin. I don't believe that we want any more of these varieties that are only good for home use.

Mr. GARDINER. I want to speak of an apple which I think is not generally grown in this vicinity, which I have always called the Strawberry, but I have discovered that Downing gives the name of it as *Richard's Graft*. We have had it on my place forty or fifty

years. My impression is that it is of English origin. It is a very nice apple. They have kept very well indeed up to this time, but I should not consider it as good for eating, except in November or December. It bears every year, and is a very good apple, but might not be profitable for a market apple.

Mr. SWEETSER. I think the apple that Mr. Gardiner speaks of is the *Moody* apple. It originated in New Hampshire. We have it in the Portland market, and consider it a very rich, nice apple, and it is very handsome. All I know in regard to it is what I have read and seen of it in the market, and I have bought twenty trees on the strength of that. My idea is that, in localities where there is a home market for it, it is a very valuable apple, but for shipping, I think no apple will take the place of the Baldwin.

Mr. SAWYER. I wish to call attention to the

Starkey, an apple which we have known for a good many years, and which originated in Vassalboro', in this State. It seems to me it is worthy of more general attention than it has received. It is an apple of remarkably fine quality, good appearance, a thrifty grower, bears annually and abundantly, and is a better apple, it seems to me, than any one of twenty varieties we might name. I think it is better than the Wagener, McIntosh, Hubbardston and a good many others on the list. There are other gentlemen who know more about it than I do, and I only desire to call attention to it.

The PRESIDENT. All I should say would be in its favor—that it is an early and abundant bearer, and a very choice eating apple, and that there is a great demand for it wherever it has been introduced.

Mr. GILBERT. How does it compare with the Baldwin in size?

The PRESIDENT. It is not quite as large; they all grow very fair, however, and there is but little waste.

Mr. GILBERT. What is the character of the wood?

The PRESIDENT. It is good, firm, white wood. Here is another apple called the

Dean, which originated in Temple. It is one of our choice fall varieties—white flesh, and so mellow that when it is fit for eating you can press it in your hand.

Mr. GILBERT. I think there is, in quality, no better apple among us, and certainly it is far superior to many other varieties. It is a heavy, firm fruit, that handles well in packing.

Mr. BRIGGS. One advantage is that it is a very smooth, large and well-shaped apple, and its size and general appearance recommend it for a market variety.

Ontario. Mr. SAWYER. The scions of this variety were sent to us a few years ago by Mr. D. W. Beadle, Secretary of the Ontario Fruit Growers' Association. It is said to be a hybrid from the Northern Spy and Wagener, both of which it resembles in some respects.

Mr. SWEETSER. Judging from the fruit as seen here, I should not think it as good as either of those varieties.

Westfield Seek-No-Further. Mr. BRIGGS. It is a hardy tree, but the apples are not very good for eating. It bears well and has a tolerably good sale. The apple will keep till apples come again, with proper care.

Wealthy. Mr. SWEETSER. It is not as good an apple, in my judgment, as the McIntosh Red. It is quite small. It is claimed that it will keep till March; but I should call it an early apple.

Mr. GILBERT. I have made some inquiry in regard to its keeping qualities. Its quality of flavor is in its favor, but I have yet to learn that it is of any especial value; and I think we should be very cautious about recommending it.

Talman Sweet. Hon. J. L. STEVENS. Is there no remedy for the unnatural growth that spoils a considerable portion of the fruit of the Talman Sweet? One side will be round and well developed and the other shrunken. Possibly it requires a peculiar soil; mine is a clayey loam.

Mr. SWEETSER. I have had but one tree of it, and if I could do no better with another than I have with that, I never want any more. The apples are generally small. I am ashamed to take them to market. The tree stands in as good a place as I have. I think it may be something in the soil.

Mr. CARPENTER. By taking better care of the trees we will get better fruit. The fruit is firm and sells well, if we only have enough to make it an object. I have no doubt that they can be improved in some way.

Mr. SAWYER. I think the *Danvers Sweet* is a more profitable apple than the Talman.

Miss FOSTER. I think just the contrary.

Mr. CARPENTER. My Danvers Sweet apples grow well, but do not keep well.

Mr. SAWYER. I think that whoever can raise the Danvers Sweet successfully, has as good an apple as the Talman Sweet. It is a thrifty, hardy tree, bearing some every year, and every other year abundantly, as the Baldwins do.

Mr. GILBERT. I have learned that the agents are selling the *Rolfe* apple. I think it would be well for the Society to put itself on record in regard to this fruit.

The PRESIDENT. I saw the apple last winter for the first time, and liked the appearance of it very much. It is not a very late keeper.

Walbridge. Mr. BRIGGS. It is a good sized apple, colors well, a good winter apple, but not a good keeper.

Adjourned.

EVENING SESSION.

The committee appointed to select and forward a collection of apples to the Massachusetts Horticultural Society, reported that in the performance of the duty assigned to them they had selected from the fruit on exhibition, and forwarded as directed, with the compliments of the Society, a collection of forty-three varieties of apples, as follows: American Golden Russet, Baldwin, Ben Davis, Black Oxford, Bottle Greening, Cooper's Market, Danvers Sweet, Derry Pippin, English Russet, Fallawater, Fameuse, Fall Harvey, Gravenstein, Hubbardston, Hubbardton Pippin, Hunt Russet, Hurlbut, Jewett's Red, Jonathan, King of Tompkins County, Lyscom, McIntosh Red, Minister, Moody, Mother, Newtown Pippin, Norton's Melon, Northern Spy, Ontario, Peck's Pleasant, Rambo, Red Canada, Red Russet, Rhode Island Greening, Ribston Pippin, Roxbury Russet, Spitzenburgh, Starkey, Talman Sweet, Vandevere, Wagener, Winthrop Greening, Yellow Bellflower.

Report accepted.

A letter was subsequently received from Mr. Robert Manning, Secretary, in which, after acknowledging the receipt of this collection, he said: "In behalf of this Society I desire to return thanks to the Maine Pomological Society, for this fine collection of apples, which were of much interest to our pomologists. They were placed on exhibition on the 28th of February, and as we happened on that day to have some fine roses, camellias, etc., contributed quite freely, as also vegetables, the whole made up much the best display we have

had this season, to which your apples were a very valuable contribution."

Mr. W. H. KEITH of Winthrop, an extensive orchardist, and also largely engaged in packing and evaporating fruit, was invited to open the discussion on any subject suggested by his own experience. He said,

Mr. President: I did not come in with the expectation of being called upon to say anything, but rather to listen to those who have had more experience than I. However, I will just say that this year I have been using new barrels, and that I like them for the reason that it did not take more than half as long to pack the apples as it did to get those barrels ready that we used to pick up. I think that it would be a wise plan for all of us to adopt the practice of getting new barrels to pack our apples in.

Question. Please tell us what barrels you use and what they cost.

Mr. KEITH. My barrels were made in Vienna, Maine. They are supposed to be of the same size as flour barrels, but I have never compared them. The staves were made of spruce, but they can also be made of fir or poplar, to good advantage; and the hoops generally had the bark left on them. They make a very neat, inviting-looking barrel. I believe if we would make a little effort, it would enhance the value of our product of apples in making sales. I don't know what the price of flour barrels has been this year, we used to buy them and I think we had to pay twenty-five cents for them—the same price that I paid for the others at the factory.

Mr. BRIGGS. We pay twenty cents in Androscoggin County.

Mr. SAWYER. In our locality we pay fifteen cents.

Mr. KEITH. Some of our people have bought barrels in Augusta for fifteen cents.

Mr. SWEETSER. We have to pay twenty cents in Portland.

Mr. KEITH. I think the only obstacle to establishing a barrel factory would be this: there are a great many who would not pay twenty-five cents for a new barrel, if they could get an old one for fifteen cents.

In regard to evaporating apples, I have been in the business for the last five or six years. I use the American evaporator. It takes a crew of five or six men to run the evaporator properly, and it costs seventy-five cents per day to heat it. This year I have evaporated about nine hundred barrels of apples. I had quite a large quantity of New York Russets, and also of Winthrop Greenings,

which I evaporated this year, but the Baldwin is the best apple we have for evaporating. The Roxbury Russet produces more in pounds than any other apple that we have used.

Mr. SAWYER. Is the evaporated fruit injured by keeping from one season to another?

Mr. KEITH. I think not, if kept in good condition.

Mr. SWEETSER. How is the Red Astrachan for evaporating?

Mr. KEITH. I consider it a fine apple for that purpose.

Mr. BRIGGS. Do you utilize the refuse from the factory?

Mr. KEITH. I never have. A barrel of second quality Baldwins will yield about five pounds of evaporated apples. I reckon my expenses from twenty to twenty-five cents per barrel, which would be about five cents per pound for the cost of the apples. We can safely reckon them at twelve and one-half cents per pound on an average. Even this year I do not reckon on selling at less than ten cents per pound.

Mr. SAWYER. Do you run your evaporator in the winter?

Mr. KEITH. I usually finish work in November.

Mr. SAWYER. Do you burn coal or wood?

Mr. KEITH. I burned coal this year, but I have usually burned wood.

The PRESIDENT. Is it not with evaporated fruit as with green fruit — should not there be a large difference made in the price of the product?

Mr. KEITH. Yes sir, that is what is depressing the market now.

The PRESIDENT. Do you use anything to whiten the product?

Mr. KEITH. Yes, it has to be bleached. It does not impair the quality of the fruit, however, if it is properly done. It is only the fumes of the sulphur when it is put on, after they are dried.

The PRESIDENT. Then there is no necessity of it, except for the looks?

Mr. KEITH. That is all. The first year I evaporated apples, I did not bleach them; then it was not generally practiced as it is now; but I found that the next year the demand was to have it bleached. I suppose there is quite a difference in the kind of evaporator used. The American evaporator is undoubtedly the best one for any farmer's use. This evaporator can be set up anywhere, under cover; out of doors, it can be used to great advantage.

Mr. SAWYER. Is there no waste of heat by its being out of doors?

Mr. KEITH. No, sir. The small evaporator, the second size, costs $75.00, and any one who does not have more than two hundred

bushels of apples a year, could easily get them through on that evaporator. The larger size costs $200.00. The price is $175.00, but the freight makes it cost more. Only one man is needed to run the smaller one. One girl can run it, unless you should run it night and day, and in that case you would want two men. That will turn out from three to four bushels in twelve hours. In regard to selling the second quality fruit, if you can dispose of it at $1.25 per barrel, and it is not worth any more than it is this year, you can easily figure that it would be better to dispose of it green, but if apples are worth more, as they were last year, it is better to evaporate them.

I would like to inquire of the gentlemen present if they have ever experimented with any of the different kinds of commercial fertilizers, for their trees?

Mr. R. C. PLAISTED. I have used nothing of the kind. I have used ashes, which I obtain in this city.

Mr. KEITH. I suppose there is no doubt that, with most soils, ashes are as good as anything we can use. I have used a preparation put up by the Bowker concern, which gives me very good satisfaction, but I have not used it extensively enough to recommend it. For myself, if I could get plenty of ashes, I would not wish for anything else.

Mr. BRIGGS. What do you consider ashes worth for fruit culture?

Mr. KEITH. I would pay twenty-five cents per bushel for two hundred bushels, every year.

The PRESIDENT. I would pay thirty cents per bushel for two hundred bushels. How do you apply the ashes?

Mr. KEITH. Around the body of the tree. If I had plenty of them, I would extend them out as far as the branches go.

Mr. SAWYER. I would like to call attention to the article written by Dr. Nichols, in the report of last year. The title of this article is, "The Sweet Principle In Fruits". It is a very valuable and interesting paper. [Paragraph read.]

Mr. PLAISTED. I find bone dust more profitable than ashes, on grass land.

The PRESIDENT. I want to say that ashes are about worthless on some lands, and on others they are valuable.

Mr. KEITH. What is your process of using the bone dust?

Mr. PLAISTED. I simply scatter it broadcast.

Mr. SAWYER. Can you advise us what manufacture is the best?

Mr. PLAISTED. There was a factory in Gardiner, formerly. The easiest way is to have a boiler and steam the bone twenty-four hours. The steam dissolves the bones and they can then be readily ground or pounded.

Mr. KEITH. I suppose you could not advise that way for all of us, small farmers?

Mr. PLAISTED. Yes, indeed. You would get grease enough out of it to pay for your labor. At the Cumberland factory in Boothbay they manufacture bone dust in just this way. It is the original German method.

Mr. SAWYER. I understand you that you subject the bones to the steam for twenty-four hours. What pressure do you have?

Mr. PLAISTED. We need a pressure of twenty pounds steam. It requires that amount of heat to dissolve the bones. It takes out all of the gelatine, and leaves nothing but the lime.

Mr. KEITH. Does it not impair the value of it to steam it?

Mr. PLAISTED. I think not. I think the phosphate of lime remains the same. The gelatine is dissolved, and that is not lost, for it comes to the surface.

Mr. SAWYER. You would not recommend any one ordinary farmer to do that for his own supply?

Mr. PLAISTED. Yes, sir; it does not cost much.

The PRESIDENT. This is more fertilizing in the orchard, by spreading it on the surface. We have to experiment with different kinds of fertilizers, and we would have to look sharp to see if we get any benefit from it; the grass would steal it all.

Mr. PLAISTED. We spread a good fair supply of stable dressing around the trees.

Mr. SAWYER. I believe in nature's methods, muck and leaf-mould. There is nothing quite so good, especially in an orchard. I think it is good on any soil.

Mr. KEITH. In young orchards, how long have you, Mr. President, made it a practice to keep the soil plowed up before allowing it to go to grass?

The PRESIDENT. Until within two years, we have never plowed at all.

Mr. KEITH. Have you ever grown any of the early fruits, such as the Duchess?

The PRESIDENT. Only for our own use.

Mr. KEITH. Has any one here had any experience with them?

Mr. SWEETSER. We have only raised them for our own use.

Mr. KEITH. Do you regard the Duchess as a hardy tree?

Mr. SWEETSER. Yes, and it is a great bearer.

Mr. SAWYER. Is there not more profit in forcing these trees for all there is in them, than there is in spinning it out over thirty years?

Mr. SWEETSER. I think so.

Mr. PLAISTED. Is there any such thing as driving trees so as to injure them?

Mr. SAWYER. I don't think there is. I think there is such a thing as retarding them.

Mr. PLAISTED. Does driving them shorten their lives?

Mr. SAWYER. I think not.

Mr. PLAISTED. Then why not say that more trees die by starvation than by forcing?

Mr. SAWYER. I think you would be about right.

The PRESIDENT. Is there not danger of forcing and getting the growth too late in the season?

Mr. PLAISTED. I never saw any trouble of that kind, but there may be.

Mr. KEITH. I suppose that the Baldwin tree is not regarded as being as hardy as the Astrachan or Duchess?

Mr. PLAISTED. I don't know about that; I have no Astrachan trees.

Mr. KEITH. You have Baldwins?

Mr. PLAISTED. Yes, and a good many of them are grafted in the limbs.

The PRESIDENT. Would you not prefer trees grafted in the limbs to those grafted in the nursery and at the crown?

Mr. PLAISTED. I do not observe any difference; still, it depends on how the tree is grained. I do not know but the wood of the Baldwin tree is straighter grained and more liable to split than some other varieties would be.

Mr. KEITH. Judging from what I have seen of the Baldwin tree, and what I have been told about the Duchess, I should feel like driving the Duchess twice as hard as I would the Baldwin.

Mr. SAWYER. I have but one tree of the Duchess; some of the limbs have split off, from the weight of the apples, and it split as badly as ever I saw the Baldwin.

IN MEMORIAM.

CHARLES DOWNING died at his home, in Newburgh, New York, January 18th, 1885, in the eighty-second year of his age. The following sketch of his life and character and achievements is taken, in an abbreviated form, from the address of President Barry at the last annual meeting of the Western New York Horticultural Society:

"In early life, and until about thirty years ago, Mr. Downing was actively engaged in the nursery business, in which he was distinguished as well for his skill and success as a practical cultivator, as for his accuracy and trustworthiness in all matters pertaining to the varieties of fruits or of ornamental trees and plants, cultivated and sold by him. When anything was purchased from Charles Downing, that alone was regarded as a proof of its genuineness. A more careful, conscientious man has never been known in that business.

"Shortly after the death of his gifted and greatly lamented brother, Andrew J. Downing, author of "The Fruits and Fruit Trees of America," and of several works on landscape gardening and rural architecture, Charles retired from the nursery business, and from that time until his death devoted himself to the study of pomology, and to the revision from time to time of his brother's great work, "The Fruits and Fruit Trees of America." This book is regarded as the standard authority on American fruits throughout the world, and Charles Downing came to be acknowledged one of the foremost pomologists of his day. He was a remarkably modest and retiring man by nature, and, although a regular attendant at both pomological and horticultural meetings, was seldom heard to speak, except when called upon for his opinion, which he would give with absolute frankness and honesty, but in the fewest possible words. He was not in haste to form an opinion, but when once formed he adhered to it steadfastly.

"The name of Charles Downing is as familiar as a household word in every American home where an intelligent interest is taken in rural affairs. * * * Who will take his place? is a question that will be asked. Who will keep up the standard character of "The Fruits and Fruit Trees of America" by constant revision, as he did? It is a national work, and I trust that for the

sake of the memory of the brothers Downing, as well as for the honor and interest of American pomology, it will pass into careful, able and loving hands, who will perpetrate it through future generations."

These are the words of one well qualified by long acquaintance and intimate association, as well as by similarity of occupation and tastes, to form a just estimate of the character and labors of Mr. Downing. In a letter to the writer of this notice, in 1882, Mr. Downing said:

"I much prefer the practical part of horticulture, and would rather work a week in the open air than to write a day; in fact, I have not the taste nor the ability to perform the work as it should be, and the revisions of my brother's Fruit Book were prepared at the earnest solicitation of his and my friends and much against my will, knowing that I was not able to do it justice. I intended and expected to make a new revision, * * * but it is too late now, as my health and strength are not sufficient for the labor."

Many extracts might be made from his letters, several of them written after his partial recovery from the painful accident which came so near terminating his life, all illustrating the modesty and self-abnegation which were prominent traits in his character, and his devotion to his chosen labor.

He always manifested a deep interest in the work of this Society, and was a careful and discriminating reader of its transactions. On several occasions he expressed a strong desire to attend our meetings, and was only prevented from doing so by the infirmity of his health. He was often appealed to by our members for the settlement of vexed questions in pomology; and he always investigated patiently and answered courteously, and frequently would write to them to make suggestions or ask for information on some point which had attracted his attention in our proceedings. For these reasons, as well as for his pre-eminence among pomologists, though not a member of our Society, it is fitting that we should place his name at the head of our memorial notices at this time. No society could call him its own to the exclusion of others. He belongs to every organization and every individual interested in the advancement of horticultural knowledge.

G. B. S.

FRANCIS GARDINER RICHARDS was born at Gardiner, June 10th, 1833, and died in Boston, February 10th, 1884. He received his early education in England and graduated at Harvard College in 1853, and for some time studied law, but abandoned it and decided to go into business. He made a voyage to Calcutta, but, in 1858, on learning of the death of his father, Francis Richards, of the firm Richards & Hoskins, paper makers, at Gardiner, he returned and took charge of his father's business, and, taking the paper mills, carried on a most successful business. He married Miss Ashburne in 1879. His widow and two children survive him. For many years he was an active business man—one of the trustees of the Gardiner Savings Bank, a director of the Cobbossee National Bank, and always one of the Vestry of the Episcopal Church. His death was a great loss to the community.

Mr. Richards became a life member of this Society in 1881, and always maintained a deep interest in its welfare.

G.

Hon. JOHN E. GODFREY died at his home in Bangor, February 20, 1884. He had been unwell for several days, but on the day of his decease was feeling much better. Between five and six o'clock he sat with his little daughter in his arms, playing with her and laughing at her childish frolics. Suddenly he threw back his head and in two minutes life had departed. Heart disease was the cause.

Judge Godfrey was born in Hampden, September 6th, 1809, the son of John Godfrey, Esq., for many years a prominent member of Penobscot Bar. When he was about twelve years of age, his father removed to Bangor, and after that time the subject of this notice made his home there.

Adopting the legal profession, he was admitted to the Penobscot Bar, of which he continued for many years a prominent and honored member.

He filled many positions of trust in his city and county, having been a member of the Common Council of the city four years, and of the Board of Aldermen three years, and was on the Superintending School Committee twenty or thirty years. In 1856 he was elected Judge of Probate for Penobscot County, and was re-elected seven

times, discharging the duties of that important office with great ability and to the entire satisfaction of all, from January, 1857, to January, 1881, a period of twenty-four years. He was President of the Bangor Historical Society and a member and contributor of the Maine Historical Society. He also took a deep interest in music, and for a number of years was President of the Penobscot Musical Association and also of other local musical organizations. He was always an anti-slavery man, and was one of the formers of the Republican party, and always an earnest advocate of its principles. He contributed to Griffin's "Press of Maine," a history of the press of Penobscot County. He was also a poet of considerable ability. He leaves a wife and a little daughter; also two sons by a former marriage.

Judge Godfrey was a man of great culture and fine tastes, and his late home is a lasting monument to his love and appreciation of the beautiful. He took a deep interest in horticultural affairs, and was for many years an active member and an officer of the Bangor Horticultural Society. He became a life member of this Society in 1873, and at the first annual exhibition, at Bangor, delivered an able and interesting address, which was published in full in the transactions of that year.

COM.

ALFRED SMITH, one of the life members of this Society, was a son of Isaac Smith, who, with his father, Capt. Nathaniel Smith, moved to Winthrop, Maine, from Middleboro', Mass., about the year 1795. He was born July 18, 1807, on the farm where his father died at the age of ninety, and where he had lived for about sixty years. His early education was only what the district school afforded at that early date, with a few terms at an academy in an adjoining town; but he made such good use of his opportunities that he began teaching at the age of eighteen, and followed it closely during the winter season, working upon the farm in summer, until he was twenty-five years of age. During this period he taught two years in Massachusetts, meeting with so much success that he was several times invited to take permanent situations as a teacher in private educational institutions, which he declined. This he did because he began to tire of teaching and to turn his mind more to

farming as an occupation. During all his years of study, chemistry and the natural sciences had been favorite branches of knowledge with him, and in the former he made considerable proficiency. These studies trained his mind to habits of observation and inquiring into the action of Nature's laws, which gave him a good fitness to write upon questions concerning orcharding, plant growth, etc., which he did to quite an extent in the latter years of his life. Although he practically abandoned teaching as a business when he began farming, he continued to teach school winters for many years, teaching his last term at the age of fifty-two years.

Mr. Smith married, December 1, 1832, Mary F. Shaw of Winthrop. Their family consisted of six sons, one of whom, Henry S., lives on the old farm in Monmouth; and one, Prof. George Boardman, resides in Houlton, a teacher of acknowledged ability. His widow, a lady of estimable Christian character, fine sensibilities and true benevolence, still survives, and resides with her son in Monmouth. Mr. Smith lived in Winthrop until the year 1862, when he moved to Monmouth and purchased a farm on the shore of Lake Cochnewaggin, where he continued to reside till his decease.

At the early age of sixteen, Mr. Smith united with the Baptist Church and ever continued a consistent member of the same. In 1848, when the anti-slavery controversy was beginning to assume form and shape as a social and political factor, Mr. Smith was one of three, out of over thirty male members of his church who were bold, outspoken and earnest in their opposition to human slavery. They voted as they believed and talked, and thereby incurred the almost universal contempt of their associates and townsmen. But Mr. Smith lived to see himself in the majority, and to witness the consummation of his prayers and hopes in the eternal abolition of legal bonds from men of color. A writer in the *Lewiston Journal* of March 13, 1885, in a notice of Mr. Smith, says, in reference to this fact: "Those only who lived in those times can understand what such men were obliged to endure. But he bore it patiently until he saw the reward of his labor. He is the first of the three who has gone to his rest. The other two are nearly ninety years old."

Although always a farmer, it was not till the latter period of his life that Mr. Smith began to give special attention to orcharding. About 1860, or possibly a few years later, he began the nursery culture of fruit trees by planting seeds, budding, grafting and

general care. Grafting he had learned from observation when a young man, and had practiced it successfully for many years. He grafted near the collar of the tree for hardy varieties, those more tender being grafted in the top. At one time he had in cultivation, for purposes of testing, more than thirty sorts of apples, upwards of twenty of pears, about the same number of grapes, and quite a variety of small fruits. His culture of fruits led him to correspond with the leading fruit growers of the country, and this led to his writing for the agricultural press, which he did quite largely during the last dozen years of his life. He carried on a somewhat extensive correspondence with the late Mr. Charles Downing, and received from that gentleman, as a present, a copy of the large edition of his "Fruit and Fruit Trees of America." He wrote for the *Maine Farmer*, *Massachusetts Ploughman*, *The Home Farm*, the *New York Tribune* and other agricultural journals, to all of which his contributions were most gladly welcomed. His contributions were generally upon questions of practical experience in orchard management, and from his long and close observation, and his terse, vigorous manner of expressing his views, his articles were especially valuable. He based no statements on tradition; he hated superstition; he disliked all forms of sham or pretence. One of his articles, written against the raising of cider apples, and the making of apples into cider, was rejected by the agricultural paper to which it was sent; as was also another against horse racing at fairs; but it was not many years afterward that the same paper expressed, editorially, the same sentiments to which he had given utterance. His articles on the law of transmission in plants, on the circulation of sap, on the latent buds in fruit trees and their capability to be induced into bearing boughs, led him into public controverseries, through the press, with writers who differed with him, but who were all constrained to acknowledge his ability, and that the facts which he had observed and stated were more potent than many pretty theories.

At the incorporation of this Society, in 1873, Mr Smith became a life member, and for many years was a constant attendant upon its meetings, and a large exhibitor at its fairs, in both of which he always manifested a lively interest. It is not too much to say that his example, his writings for the press, his public discussions at pomological meetings, and his exhibition of fruits at our fairs, have done a great deal to help on a knowledge of fruits, an understand-

ing of their principles of cultivation, and contributed directly to the growing of more No. 1 apples by our orchardists. To this end he was a public benefactor. He was held in high esteem by all his associates of this Society, and by his fellow townsmen and the citizens of his native county. He was an honest man. An obituary notice published in the *Zion's Advocate*, shortly after his death, concluded as follows:

"Of a sensative nature, with a delicate constitution, the constant strain that he put on his mind was too much for his nervous system, and in consequence, in his later years, his mind was less spiritual and clear, though he never faltered in his belief and trust in the Saviour."

The writer of the article previously alluded to, published in the *Lewiston Journal*, says:

"He was a close observer, a deep thinker, a patient investigator. He was both practical and scientific. Nothing in his favorite pursuit escaped his vigilance or analysis. He had a remarkable knowledge of the botany and chemistry of fruit growing, and in these branches he availed himself of the best helps and made the best use of them. It was a treat to go with him through his extensive grounds and see how admirably he had succeeded, and hear him talk on his chosen themes. In a just sense he was a philosopher. He gave a reason for all he did and believed. He received nothing as a fact until he was convinced by facts of its truth. He was a self-made man, an original investigator, a lover of truth, and a candid listener."

Mr. Smith died at his home, in Monmouth, February 19, 1885, aged 77 years, 7 months.

SAMUEL L. BOARDMAN.

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