Public Documents of Maine:

BEING THE

ANNUAL REPORTS

OF THE VARIOUS

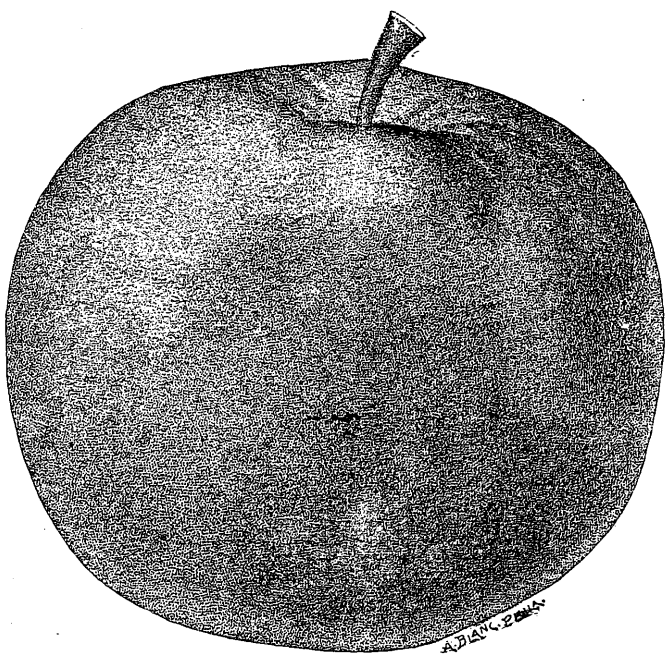
Public Officers and Institutions

FOR THE YEAR

1887

VOLUME II.

AUGUSTA:
BURLEIGH & FLYNT, PRINTERS TO THE STATE.
1889.



DUDLEY'S WINTER.

Originated by J. W. Dudley, Castle Hill, Aroostook County, from seeds of the Duchess of Oldenburg. Large, regular in form, smooth, slightly striped with pale red. Mild acid, fairly rich. Winter. Perfectly hardy.

AGRICULTURE OF MAINE.

THIRTY-FIRST ANNUAL REPORT

OF THE

SECRETARY

OF THE

Maine Board of Agriculture,

FOR THE YEAR

1887-8.

PRINTED BY ORDER OF THE LEGISLATURE.

AUGUSTA:
BURLEIGH & FLYNT, PRINTERS TO THE STATE.
1888.

To the Honorable the Governor and Council of Maine:

In compliance with the law of the State, I have the honor to present the report of the doings of the Maine Board of Agriculture for the year ending June 1, 1888.

Z. A. GILBERT, *Secretary.*

AUGUSTA, June 1, 1888.

MAINE BOARD OF AGRICULTURE—1887.

OFFICERS.

J. M. DEERING, PRESIDENT.

B. A. BURR, VICE PRESIDENT.

Z. A. GILBERT, SECRETARY.

MEMBERS CHOSEN BY COUNTY SOCIETIES.

			Term expires Dec. 31,
Cumberland County,	W. W. Harris,	Cumberland Center,	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
Aroostook "	Francis Barnes,	Houlton,	1888
Piscataquis "	Thomas Daggett,	Foxcroft,	1888
Penobscot "	B. A. Burr,	Bangor,	1888
Franklin "	E. J. Gilkey,	Strong,	1888
Knox "	A. J. Tolman,	Rockland,	1888
Androscoggin "	L. H. Blossom,	Turner Center,	1889
Lincoln "	E. W. Stetson,	Damariscotta,	1889
Waldo "	R. W. Ellis,	Belfast,	1889
Kennebec "	S. C. Watson,	Oakland,	1889
Washington "	D. W. Campbell,	Cherryfield,	1889
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.

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OFFICERS.

B. A. BURR, PRESIDENT.

A. O. PIKE, VICE PRESIDENT.

Z. A. GILBERT, SECRETARY.

MEMBERS CHOSEN BY COUNTY SOCIETIES.

				Term expires Dec. 31,
Aroostook	County,	Francis Barnes,	Houlton,	1888
Piscataquis	"	Thomas Daggett,	Foxcroft,	1888
Penobscot	"	B. A. Burr,	Bangor,	1888
Franklin	"	E. J. Gilkey,	Strong,	1888
Knox	"	A. J. Tolman,	Rockland,	1888
Androscoggin	"	L. H. Blossom,	Turner Center,	1889
Waldo	"	R. W. Ellis,	Belfast,	1889
Kennebec	"	S. C. Watson,	Oakland,	1889
Lincoln	"	E. W. Stetson,	Damariscotta,	1889
Washington	"	D. W. Campbell,	Cherryfield,	1889
Cumberland	"	W. W. Harris,	Portland,	1890
Oxford	"	A. O. Pike,	Fryeburg,	1890
York	"	J. W. Deering,	Saco,	1890
Somerset	"	G. J. Shaw,	Hartland,	1890
Sagadahoc	"	F. S. Adams,	Bowdoin,	1890
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.

REPORT.

ANNUAL MEETING, 1888.

The annual meeting of the Maine Board of Agriculture was held at the office of the Secretary, at the State House, agreeably to the provisions of the statutes, January 18 and 19, 1888. The meeting was called to order by Vice President B. A. Burr at 10.30 o'clock, and the published call for the meeting was read by the Secretary. On motion of the member from Lincoln, a committee on credentials was appointed, consisting of

E. W. Stetson,
E. J. Gilkey,
Thomas Daggett,
} *Committee on Credentials.*

The committee subsequently reported the following new members duly elected:

Sagadahoc County,	F. S. Adams,	Bowdoin,	
Somerset "	G. J. Shaw,	Hartland,	
Cumberland "	W. W. Harris,	Portland	(re-elected),
Oxford "	A. O. Pike,	Fryeburg	"
York "	J. M. Deering,	Saco	"

The report was accepted and the persons named were declared entitled to seats on the Board for a term of three years.

On motion of Walter Balentine a committee was appointed to receive, sort and count votes for a President and a Vice President of the Board, and Walter Balentine, W. W. Harris and E. J. Gilkey, were made that committee.

Proceeded to a ballot and elected unanimously,

B. A. Burr, *President.*
A. O. Pike, *Vice President.*

On motion of member from Washington, a committee on pay-roll was appointed, consisting of

D. W. Campbell,
S. H. Blossom,
A. J. Tolman,
} *Committee on Pay-Roll.*

On motion of member from Cumberland an advisory committee was chosen, as follows:

B. A. Burr,
M. C. Fernald,
} *Advisory Committee.*

The Secretary of the Board made a full report of the work for the year.

M. C. Fernald, member from the College, introduced the matter of the appropriation in support of experiment stations now pending in Congress, and asked the prompt action of the board in aid of its passage. On his motion it was

Voted, That the Maine Board of Agriculture, recognizing the great importance to the agriculture of our country of the experimental work and investigations to be carried on by the experiment stations, organized under the Hatch Bill, respectfully urges an immediate appropriation by Congress for this specific purpose.

It was further voted that the Secretary of the board be instructed to telegraph, at once, the action of the Board in the matter to Washington.

Adjourned to 2 o'clock P. M.

AFTERNOON.

Met agreeably to adjournment, President in the chair.

The following communication from the Turner Center Dairying Association was presented and read by the Secretary:

TURNER CENTER, January 16, 1888.

To the Honorable Board of Agriculture of the State of Maine, especially the Honorable President and Secretary of the Board, as these two officers are made by a resolve of the Legislature of the State, an authority to adjust premiums to be paid by the Eastern Maine State Fair at Bangor, on dairy products.

In accordance with the advertised programme of the Eastern State Fair of 1887, I made an exhibit of creamery butter, at great labor and expense, for all the first premiums offered by said society, and

they were awarded me by the judges. I hold in my possession at this time all the first prize awards on creamery butter at that fair amounting to fifty-five dollars. At last, I received a check for just two-thirds of this amount, accompanied by a statement that they deducted one-third on account of my having no competitor. As I understood it, all those premiums for which the State furnished the money would be paid in full, at all events, whether the fair was a success or a failure, financially. There is no pretension in any direction that I did not make a good show.

Now, gentlemen, I appeal to your honorable board to look into this matter and see that right prevails. Please find enclosed the returns I got from this fair, preserve them and return to me as I have further use for them if you can do nothing for me.

Yours very respectfully,

HENRY TURNER,

Late President, Turner Center Dairying Association.

On motion, the following members were appointed by the chair as a committee to investigate the matter and report at a subsequent session: J. M. Deering, York; G. J. Shaw, Somerset; S. C. Watson, Kennebec.

SHALL THE INSTITUTE WORK BE MODIFIED?

BY J. M. DEERING, Member from York.

Mr. President, and Gentlemen of the Board of Agriculture: Another year has passed away, and carried with it its joys and sorrows; home circles have been broken, and only a few days since our State House was draped in mourning for our beloved Governor, whose honor and goodness were appreciated from those in the highest circles to the most humble servant. Yes, the whole people felt the blow, but the vacant place was filled, and the State marches on in all its glory. As servants to our State we have met, in accordance with our duty, to review the business of the year as pertaining to the agricultural interests; not only to review, but to devise plans and methods for another year's work, whereby we can raise the standard of our agricultural interests to a higher type. We should concede this fact: That we are living in the most enlightened day of the world's history; that there is no standing still to the American

people; that they have long since inscribed upon their banners all over our broad land, "Progress."

It seems somewhat marvelous when we look back only the short period of two hundred years, and behold our country an unbroken wilderness stretching from ocean to ocean, and to-day the State of Maine helps swell the number to sixty millions of free people. And this vast number of people must be fed and clothed, and the material must come from the soil. This gives us some idea of the responsibility that rests upon the farmers. To be sure the farmers have made great improvements, and have progressed fairly well as compared with those engaged in other trades or callings; but there is a broad field stretching out before them which they have yet to cross before they reach perfection. As they press forward and think they are succeeding fairly well, the demand for better products is increasing, competition with other sections of the country grows sharper, and they look about themselves only to find the field as broad as ever. Now while our agriculture is to a certain extent the foundation of all other industries, and no other industry can possibly exist without it, no other industry furnishes employment to as many people; and those engaged in other industries, the farm feeds them all.

The questions which command the attention of the board at this time are of peculiar interest to the farmers of our State. Whatever is designed to promote the interest of agriculture will meet with hearty sympathy and co-operation from the farmers. So vast an interest should command the protection and encouragement of every agency that may be invoked in its behalf. Under this same condition of things the people of our State thirty-one years ago deemed it necessary to promote their agricultural interests, and caused an act to be passed by the legislature thereby establishing the State Board of Agriculture, and at the same time appropriating seventeen hundred dollars annually to meet the expenses, and also bestowing upon the Secretary, as compensation for his labors, eight hundred dollars per annum. Now in looking over the reports, I find the second annual report, printed in 1857, contained 227 pages of written matter, and a very good report for that time.

During the history of the board of agriculture, if I understand it correctly, there have been three methods by which the work has been carried on. By the first method committees were chosen from the members of the board with duties assigned, such as making

report to the secretary upon certain subjects. Circulars were issued and sent out by the secretary to certain gentlemen throughout the State, making inquiry in regard to numerous matters; and the reports of agricultural societies were published in the State report in detail. This continued for a number of years, when the second method was established of holding semi-annual meetings, and papers were read upon farm topics at this, and also at the annual meeting. During the period of this method the Maine State Pomological Society came into existence, and the doings of this society were contributed to the State report, making it a report of some four or five hundred pages. This line of work was carried on for a number of years, when the present system was adopted, and bringing into existence county institutes. During the existence of the present method or system, we have had added to the State report the report of the Maine Fertilizer Control and Agricultural Experiment Station, making our present State report a book of six hundred pages, modern, improved, containing both practical and scientific work, and highly appreciated by the farmers of the State.

Now by examining the reports, we must admit that these three changes were all improvements in the right direction; it proves the fact that the board of agriculture has not been standing still, notwithstanding the fact that the State appropriation has been cut down several hundred dollars, and also the secretary's salary two hundred dollars. Now, in the face and eyes of justice, I claim that this is not fair play with the board of agriculture. While the past shows an increasing demand for more and better work, the board has been obliged to furnish such work that would meet the requirements of the times without sufficient funds to provide it with.

During the existence of the board, these three systems of carrying on the work have occupied about the same number of years. Now the question arises, shall we continue the present system, or shall we make a change? At the last annual meeting the board made an earnest effort, by unanimously passing a resolution recommending our legislature to increase the appropriation whereby they would be able to increase the institute work. And I understood that every member of the agricultural committee were in favor, but on account of that unfortunate affair, the cattle disease investigation, costing as it did, some two thousand dollars, which was charged to the agricultural interests, defeated the resolution and also caused the setting aside of other important measures that the board recommended,

leaving the board just the same as before, in rather a pinched condition financially. Nevertheless, let us renew our energies, sharpen well the tools we have to work with, and hew out a new frame, cherishing the hope that in the future we will be furnished with the material to finish the structure.

The county institute work has been a success, and it is my opinion that it would not be good policy to dispense with it altogether. But instead of holding quite as many, reduce the number to such an extent as to be able to hold two or more State institutes, in such locality of the State as the board deems it proper; and each institute hold a two days' session, and cover the territory of two or more counties. The reason why I think I can see a demand for this change is because our Pomona Granges, are in a measure, taking the place of the county institutes. At these meetings all common farm topics are discussed. Farmers are becoming better educated, and the day is passing by when the farmers of our State will be obliged to call upon the Board of Agriculture to inform them what it costs to produce a pound of butter, beef or pork, especially where a live grange exists. Now I don't wish to be understood that we should lay aside the practical part of our work, but by holding the State institutes, they would be advertised to a greater extent, giving us more time to prepare for them; and in this way we could put in better practical and more scientific work.

The manner in which the institute work has been carried on is familiar to all the older members of the board, and for the benefit of the new members I will say that the custom has been for the secretary to outline the work, after conferring with the local members of the several counties, informing himself of what subjects the people in their county wish to have discussed, then gather such members of the board as are best acquainted with the subjects. For instance: If the subject be small fruit, or the breeding of horses, members would be selected from the board that were engaged and interested in this particular line of work, and occasionally bring in outside help. And of late considerable help has been obtained outside the State. Now whether this system of carrying on the institute work is right, or not, is for the board to determine. They should not lay all this work off upon the secretary, without being recommended by them. There is more or less responsibility pertaining to this, and they should bear their share; besides, it is their business to see to it that this help is not too expensive, or that it is expensive enough

and the proper kind. In order for the board to keep apace with the growing intelligence of the farmer, coming about as it does through the influence of the grange and its teachings, its members will be obliged to devote more time to study, keep themselves better posted, that they may be able to dig deeper into the foundation principles of the farmer's interests. It should be the duty of the board to see to it that the farm products are not *taxed* but *protected*, that our farming interests be kept diversified. History shows that no State, or even nation, ever showed any marked degree of prosperity without diversified industries; hence our agricultural and manufacturing interests should walk hand in hand. They should be protected; what helps the one helps the other. If you will take notice, you will find in those sections of our country where free trade sentiment predominates, it is those States where their industries are not diversified to any great extent. Excuse me, gentlemen, I am a little off my subject, but this is not politics, it is the people's business interests, and I wish to suggest to the board that they put in their protest in behalf of the farmers' interests of our State against any action or any legislation that will tend to throw our markets open to the world.

In endeavoring to elevate agriculture to its proper place, we should by no means speak slightly of other callings. While all are dependent on the farmer, the farmer is dependent on all. The farmer could not pursue his business with profit without the mechanic, on whom he is dependent for implements; and without those who are engaged in other pursuits the farmer could never find a market for his surplus products. In all the useful pursuits of life there is a kind of family interest. Each is beneficial to the other, and there need be no rivalry, no jealousy; each may well rejoice in the success of every other. In the great and useful agricultural industry we need the countenance, the influence and the co-operation of all.

Following the reading of the paper by the member from York, the member from Washington presented a paper on the subject.

CAN THE PRESENT APPORTIONMENT BE IMPROVED?

By D. W. CAMPBELL, Member from Washington.

To the question, can the present apportionment be improved, I answer, yes, but with some hesitation, for every member here is jealous of the rights of his own county—thinks its portion too small—and will listen with apprehension to any project of re-adjustment. There are some features, however, of the present division of the money, to which I call your attention and which deserve our candid consideration.

The object of the State aid to societies is to encourage them in their efforts to improve the condition of agriculture in their several localities. The principal involved is essentially American and our use of it is a local application of that policy of protection which has made us the most progressive, productive and independent of modern nations. The same general rules will apply in both cases. Funds from the national treasury are neither competent nor sufficient to support any industry, but are to develop and strengthen all. When a certain industry has been aided or protected until it is self-supporting and is contributing, as originally desired, to the prosperity of its State, the help is withdrawn and directed to other industries as their needs may appear. Just so, some societies are well equipped, are active and liberal agents in the promotion of agriculture and are financially independent. To that extent their claim upon State aid is less and it becomes the duty of this board to determine what society may need it more. The present apportionment is made per capita without regard to the condition, situation or comparative number of the class most deserving its benefits. Nine of the counties have less than 40,000 population and receive the lesser money, are backward in agriculture and need more. Oxford, Franklin, Somerset and Piscataquis border on and extend into the wilderness. Farming must employ the energies of their citizens as lumbering becomes less remunerative. Sagadahoc, Lincoln, Knox, Waldo and Hancock have passed through great financial depression from the downfall of shipping and are eagerly turning to the neglected fields and to the fertilizing privileges of their shores.

Societies in thickly settled sections, and on lines of railroads, have always a good home patronage and can draw by rail an ever increasing crowd, while those in sparsely settled counties have neither the large

attendance which situation in towns or cities insures, nor means of communication to collect great numbers. The general public will now attend readily any fair conducted with proper enterterprise and due regard to order. Those fairs also which are near centres of manufacture and trade draw a greater proportion of non-exhibitors and the net receipts are correspondingly large while those in agricultural centres are attended mostly by exhibitors and the proceeds are correspondingly small. Add to this, that in the central and western parts of the State agriculture is independent, prosperous and progressive, while in the northern and eastern it is dependent or associated with other callings. And we see plainly how unequally the societies that need this help and encouragement are benefitted by the present apportionment. The table of returns shows that there are a number of societies in the counties to which I have referred, and in others also where farming is the chief occupation, that are not doing the work and are not exerting the influence that is expected of agricultural societies to-day. More material aid expended after mutual consideration of their wants will probably infuse new life into their exhibitions and into some of these societies. I don't say which might willingly dispense with a part of their State aid for so worthy an object.

Following the reading of this paper the subject was discussed at length by the other members.

Mr. WATSON of Kennebec. I heartily endorse the sentiments of the paper just read. I fully believe that the apportionment is not distributed as it should be. According to the principle of taxes, it seems to me that it is apportioned on the principle that "to him that hath shall be given, and from him that hath not shall be taken away even that which he hath." That is, the society able to get along without help, receives the most help. In considering this matter, I have thought that it might be changed so that the purpose to which the State aid was given should be accomplished. There are several things prominent that operate to hinder the success of an exhibition. A fair may be held at the same time with a neighboring fair, or weather may operate to detract from its interest. Consequently the society is hindered from meeting its purpose. Their revenues would be cut down somewhat, and their resources limited. Sometimes our societies are crippled from these causes and when they look to the State for expected aid, it doesn't come. If it could be arranged that the State aid now given to the more prosper-

ous societies which are able to maintain themselves without it, should be directed to the weaker societies, I believe that the object would be more fully accomplished.

SECRETARY OF THE BOARD. I wish to show to the members of the board some of the peculiarities of this matter of the apportionment. The societies best able to take care of themselves, receive the greatest proportion. You see the impropriety of such an apportionment. The State aid to societies is apportioned on their disbursements. That society whose receipts are the largest has the most money to expend and thus secures the largest bounty from the State. At the same time such a society is best able to take care of itself without aid. In Oxford county, as an illustration, there are two efficient societies. The Oxford County Society located at Paris, receives a large patronage and raised more money the past year than any other society in the State. Two years ago this society received from the State $260. The West Oxford located at Fryeburg is doing equally good work, but its patronage is less, and its bounty from the State for the same year was only $96. The Ossipee Valley Society by special act of the Legislature gets $200 each year, while the York County Society, covering several times as much territory, last year got only the same money. The Cumberland Society gets $400 and the Androscoggin the same, while in Penobscot county the four hundred dollars must be divided among four societies, and in Franklin $148 must be divided among three, and the Franklin County, the strongest of the three, gets the most of that. These discrepancies are continually coming up between your secretary and the societies, hence the subject was brought before this meeting for your consideration.

Mr. SHAW. Is this matter entirely under the control of the board?

Sec. GILBERT. No, sir. It is introduced to the attention of the board from the fact that under the law providing for the board of Agriculture, it makes it the business of the board to look after these matters, hence it is the proper business of the board to do anything about the law that will help the case.

Mr. WATSON of Kennebec. I think that the statement is very clear and it seems to me that it is proper for the board to take some steps toward having that statute modified so that the distribution will go where it will do the most good. If the secretary could make the apportionment on the sworn statement as to the financial condition, the apportionment might be made more equal, that is, it would

go to the society that most needs it, and I hope that some measure will be devised so that this statute may be amended to suit the case.

Mr. DEERING of York. In regard to York county I will say that there are now four agricultural societies,—four and a part of a one—and they make a division so that they take such and such towns for their territory, and outside of these they won't pay any premiums. The York County Agricultural Society offers the premiums to the whole county and takes in all the societies. For years past the people from Cornish have come down to our fair and got our money, after getting their own, and when the stipend is divided we get only a little. Other societies get it. I am against having so many societies.

Mr. CAMPBELL of Washington. Is your society conveniently located so that all can attend?

Mr. DEERING. Yes, we give them the privilege to go and they come.

Mr. CAMPBELL. In our county the thing is different. One society could not do the work because the county is a large one, and the societies are now situated over thirty or forty miles apart.

Mr. HARRIS of Cumberland. I don't know much about this matter, but it seems to me that there is something wrong about this. When you get round to the point that the board of agriculture has control of these societies and this money, then you are going to the root of the matter, and you won't have one society interfering with another society's time. If the time and arrangements were under the control of the board we would avoid all that. I would suggest that somebody makes the motion that a committee of three be raised during this session to take this matter into consideration and report at the next annual meeting some plan to be recommended to the next legislature. I simply make the suggestion. I think that the matter should be controlled by the board of agriculture.

Sec. GILBERT. It has occurred to me that there are two ways out of the dilemma. The one is to follow the example of Massachusetts, which gives each incorporated society a specified sum of money. The Canadian agricultural societies are also aided in the same way. Massachusetts gives to each of its incorporated societies $600. It is not apportioned to the counties but to the societies. Another method is to so change the law as to place the apportionment of the State aid in the hands of the board of agriculture, having all the returns sent in to this board, and then apportion the money where

it is most needed. The needs may change. Some unforeseen circumstances may bring calamity to a society, and they will need special aid for the next year. This board of agriculture is a body which would take measures that would result in doing the most good with this money.

Mr. DEERING. I have been aware that there is something wrong about this matter of the stipend. This is business, and as far as the suggestions are concerned, the first suggestion strikes me the more favorably.

Mr. HARRIS of Cumberland. There are some few things more about this. The board of agriculture has absolutely the right to indicate the way that one-half of this money should be spent. When the board of agriculture controls the whole of it, you are getting a little nearer home and you may make this stipend of much more benefit to the farmers of the State.

Mr. CAMPBELL of Washington. The difficulty is mainly on the amount of the stipend and the division of it.

Mr. ELLIS of Waldo. I think that if the last recommendation of the secretary were to be fully discussed we should need more than a two days' session.

Mr. GILKEY of Franklin. In our county we have three societies. When the third society was formed, we made it a rule that the largest society should send the first member to the board, and the next largest the next and so on. The member who is here when the apportionment is made naturally would favor his own society, so I could not agree with our secretary's and Mr. Harris' suggestions. I should advise to leave it with the legislature of the State.

Sec. GILBERT. I will explain my position further. The gentleman last up says that one might favor his own society. There is the advantage of the course I proposed. There would be seventeen other men to prevent his doing it. In the apportionment of the funds or anything else, any irregularities or inconsistencies proposed by a member would be balanced by the sober judgment of the others; and I am fully convinced that there is no other way that you could secure so great equity. The returns are the documents put into the case and you are here to consider them. The judgment of the board is the balance over which they are laid. There is no necessity to call in the testimony of the whole county.

President BURR. I do not think that we can adjust this matter in half a day or a few minutes. This must go before the whole people of the State. We should deliberate carefully and give the best

advice that we can so that it may meet with the approbation of the members. I would favor the appointment of a committee.

Mr. DEERING of York. We do not expect to settle this to-day, but it is proper to discuss the question before appointing the committee and then perhaps the committee would have some ideas to work upon. There is no mistake that there is a wrong, and the question is to get it right. My idea is that each society should know what it is to get.

President FERNALD. I do not rise at the present time to renew the discussion, but to second the proposition for a committee when the proper time shall come. I can see that the problem is somewhat complex and that there are practical difficulties in the way of adjusting the amounts of the different societies. Possibly it might be done if the other scheme were adopted of dividing equally between the societies. It should be borne in mind that the weak society of this year would be strong some few years hence, and so such a measure should be sufficiently elastic to cover all such cases. The only way would be to refer it to a committee who should give the subject the proper study, and I trust that will be done before we get through with the subject; and if that is done, I have the suggestion that the report of it shall be made a year hence. Then with the approval of the board, let it go before the legislature.

Mr. WATSON of Kennebec. It seems to me that the second suggestion indicates the better way. As the gentleman says, the weak society of this year may be the strong society of next year, and the weak society of this year should have all the strength that can be given it. There may be a deficiency in its revenues. If it takes three-fourths of the bounty, give it, and next year perhaps give it to another society.

Mr. DEERING of York. I see nothing the trouble with the first suggestion. Give them the same amount and if they can manage well and have good luck they will come out all right. Weather and other fairs at the same time may sometimes interfere, but the proportion of the stipend will give every one fair play.

Prof. BALENTINE. It strikes me that the board of agriculture must do it anyway if the distribution is going to be altered from what it is at the present. If you should send a communication to the legislature to the effect that in your opinion the law should be changed, do you think that the legislature is more competent as a whole, to make a more just apportionment than the board of agriculture?

On motion of Prof. Balentine it was

Voted, That a committee of three be raised by the board, to act in connection with the president and secretary, to consider the question of whether the present apportionment of the State aid to agricultural societies can be improved, and to make such recommendations in regard to a change in the law as may best correct the present defects in the same, and report at the next annual meeting of the board of agriculture.

Adjourned to 10 o'clock Thursday.

THURSDAY—FORENOON.

The board met according to adjournment, the president in the chair.

The secretary of the board made a statement that he had been unable to get the printing of the annual report done so promptly as was desirable, and as a consequence the completion of the volume had been delayed to a later date in the year than heretofore. This was caused by a pressure of other work in the office of the State printers and which was allowed to take precedence; and he suggested as a remedy that the board take measures to get authority from the Legislature to allow him to get the work done elsewhere, provided the expense should be no more than the contract price with the State printers.

The president announced the following committee on the readjustment of the State aid to agricultural societies; J. M. Deering of York, R. W. Ellis of Waldo, F. S. Adams of Sagadahoc.

Prof. Balentine of the State College then called the attention of the board to the recommendations made by the cattle commissioner in relation to changes desirable in the law relating to contagious diseases in order to make it more effective, and on motion it was

Voted, That a committee be appointed to take under consideration an amendment to the law on contagious diseases among cattle, and to report at the next annual meeting of the board such changes as seem advisable for the better protection of the stock interests of the State as suggested by the cattle commissioners in their annual report.

A. O. Pike of Oxford, G. J. Shaw of Somerset and D. W. Campbell of Washington were appointed as the committee.

The suggestion of the secretary of the board in regard to a more prompt printing of the annual report came up for consideration and after discussion on motion of the member from Waldo it was

Voted, That a committee be appointed to look up the matter and report to the next annual meeting of the board such conclusions as they may have arrived at, or make such suggestions as they deem called for.

The chair appointed the following members that committee: Francis Barnes, Aroostook; A. J. Tolman, Knox; Thomas Daggett, Piscataquis.

Mr. DEERING, chairman of the committee to which was committed the protest of the president of the Turner Center Dairying Association against the withholding of a part of the premium awards on creamery butter at the Eastern Maine Fair made the following report, which was accepted and it was voted that it be placed in the hands of the president of the board to be laid before the officers of that society and a copy be sent to the president of the Turner Center Dairying Association.

WHEREAS, The State of Maine appropriated the sum of $1000 per annum to each of the State societies, to be used as special premiums for specific purposes; and whereas, the dairy interests are included among the leading interests to compete for a certain portion of said appropriation; and, whereas, the Eastern Maine State Fair Association have refused to pay in full certain first class premiums upon dairy products, on account of there being no competition in said class; therefore,

Resolved, That the action taken on the part of said society is detrimental to the interest shown in competing for the several premiums, besides, being a special appropriation, and coming outside of the jurisdiction or general rules of said society, it is the sense of the State board of agriculture that all such premiums should be paid in full.

In accordance with the programme announced in the call for the meeting the subject of the "General Work of the Board" was taken up for discussion.

Mr. DEERING restated some of the ideas advanced in the paper read by him, and claimed that the present system of work was a great advance over former methods.

Mr. BARNES of Aroostook claimed there could be improvements made over the present methods if the law were elastic enough to

admit it. There should also be a more judicious use of the State funds paid to agricultural societies. Yet it is so difficult to get the Legislature to act reasonably that it is doubtful if anything can be done. We don't want to lose the money for institutes and in whatever action may be taken we must guard against that. There should be some elasticity to their arrangement so that when it is advisory we can have a single meeting; but when it is more advisory, we can have small meetings, as in Aroostook. We could not have a single meeting there; but in some places large meetings of great usefulness might be held.

Mr. CAMPBELL of Washington. The locality in a large part of the State east of the Penobscot river, or Hancock county, has not the means of representing such institutes. I don't think there has been any institute held in Hancock county, for there has been no invitation given. But institutes should be held there, whether they get an invitation or not; and I think it is best to extend the benefits of these institutes to these localities.

Mr. HARRIS of Cumberland. The members of the board are quite familiar with the condition of things under the old law before the organization of institute work was made. It was the custom to hold two meetings a year, and these meetings were, of course, only accommodated to local points. The thought in making the change was to give all the sections of the State an equal chance, and equal benefits from this work. Other States have taken that matter into consideration. I have in mind some thirteen States that are doing this. Wisconsin has eighty-five meetings, and they pay a man a salary of $1500 and expenses, to direct this work. He is authorized to get the best extra help in the country, and he has taken his helpers from other States. We can't increase the appropriation at once. It will increase in time. It is going to come in time if we are up to the requirements of the occasion and show that this board is worthy.

Mr. WATSON of Kennebec. Where institute work is best known it is best appreciated. In most of our counties and towns where the institute work is carried on extensively, there are still many who are ignorant of what the board is doing, but after a while they become cognizant of this work and appreciate it, and there is an earnest call from these places for a second meeting. Instead of equalizing the work, the aim should be to increase the appropriation so that the work can be extended over the State, and there can be held three or

four instead of one in a county. I don't think that it is best to bring in foreign speakers. The benefit would hardly be commensurate with the expense. Increase the appropriation so that we shall have more means with which to work.

President FERNALD. I was a member of the board then, and I believe that the institute work has been doing much more for the agriculture of the State than those meetings did. An effort should be made toward increasing the number of meetings and reaching points that are not now reached, instead of working in the other direction. I have been hoping that Hancock county would be reached. If the work should be carried there, in a little while we should find that we should have a member of the board from that county, and there would be a waking up down there. I think we shall do as well to work in the direction of securing more means for the purpose of enlarging the work of the institute, making three or four meetings rather than two, as is now the case.

Mr. ADAMS of Sagadahoc. I heartily endorse the statements of the last gentleman. I know that in many places nothing is known about the institute work. They hardly know when we hold one, and it is very difficult in many cases for them to attend. We should bring them before the notice of the people. That is the way we shall get more money. The people will ask the Legislature for the money, and when the people take the matter into their hands they will get it. I hope that we shall have one or two institutes in each county.

Secretary GILBERT. This is coming to the very gist of the matter. The question now arises whether the board of agriculture should do missionary work. Since the work was started in our State, we have held three institutes in Hancock county. There are many localities where they don't know anything about us. Shall we go into these sections? The first time we try we may not have successful meetings. It is pleasanter for us to go where we are well received. It is a question whether we shall go where missionary work is needed, or to the place where we are well received. We find that this interest may be developed where missionary work is done. The policy of the Secretary is, and has been, to leave the question in the hands of the local member, and his opinion is a guide in the matter. I have considered it best to defer entirely to his opinion in this matter. I want you to instruct your Secretary on this point. Shall the effort be to multiply institutes, or shall it be to put better and more material into the institutes now held? Elevate the standard of the work or

multiply the number? If you multiply the number, you must economize in expenditure, using a less costly material with which to work. I have letters on file now, from sections where we have held institutes, and the call in every direction is, "Give us more institutes." Now, I want you to tell me what course I shall take.

Mr. ELLIS of Waldo. There seem to be two ways of instructing and benefitting the farmers. One is to get better material with which to work—better speakers, more scientific men, at a greater cost, who will further educate those who are already the better educated of the farmers. The other question is whether you will bring up the laggards who are behind. Which is the better for the agricultural interests?

Mr. ADAMS of Sagadahoc. I am in favor of more institutes. The people must become better acquainted with the work, and when they come to this, they will support the meetings. Then the people all over the State will appreciate them and we can afford more legislation.

Mr. ATHERTON of Hallowell spoke as follows: I know that these institutes are doing a noble work, and are making a progress that is highly appreciated by the farmers of the State. In the reports which are now coming out from year to year there is made evident a marked progress in the workings of the board. It is just like the workings of anything else, the work in the manufactory, the better class of work that is done meets with the highest appreciation and never has to go begging customers. My opinion in regard to the institute work is that the institutes should neither be multiplied nor curtailed, but that as many institutes should be held throughout the different counties as the present appropriation will allow. I would urge that the board make a strong appeal to the Legislature for an increased appropriation, at the least not less than $2500, in order that the secretary may be better enabled to carry out the work. My idea is to hold the institutes as they are now held through the different counties, and more especially in those places where the institute has not come, so that the board may be brought into closer connection with the farmers in those places where institutes are little known. If possible, I believe it would be a good idea to hold a State institute at some central point. I know that they do in other States, and that they are appreciated and largely attended.

Mr. PIERSON of Vassalboro'. I heartily endorse Mr. Atherton's statement. The idea is to bring this matter before the people. All

the work of the board has been circumscribed by the want of sufficient funds. These can be secured more easily by bringing the matter before the people and letting them have the opportunity to see their own needs and the needs of the State. I believe especially in bringing into the service of the board men who are well informed on the subjects that they intend to treat and if that comes at high cost I think that the means to bring these men into the service of the board should be furnished by the State. Of course home talent is good as far as it goes; but if we have not the talent at home which is sufficiently well informed, let us have talent that is. I think that the legislature, when they see the reasons, will be fully up to the demands of the board.

President BURR. This is one of my particular hobbies—farmers' clubs and institutes. I believe that they have done more to elevate the men, women and children of this State than any other organization that ever existed before. They have taken people when in just the state to be improved, and have created an interest. We have all classes equally interested in our work. These institutes have cost us $1400 a year, and we are afraid to go before the Legislature and ask for a further appropriation. I don't find any other men who come into our institutes who are not equally interested with the farmers themselves.

I think we have not much pluck if we do not ask the Legislature for a little increase. You must remember that the whole people are becoming improved and as the people grow better, the institutes should grow better. I don't believe in being afraid of asking the legislature, and I don't believe they will refuse to grant a reasonable amount.

Mr. DEERING of York. The discussion has taken the course which I expected, and I am glad that it has. The object of the paper was to renew what was commenced last year. The board of agriculture made an effort to increase the institute appropriation whereby they could carry on better work, and we failed. It is not my policy to take any back tracks. In preparing this paper, I suggested that we should have more money, and I say that the county institutes have been a success. It was not my policy to change them, but to have more money and increase the work. I don't say that the institute work should be essentially changed, but the board of agriculture ought to have the power to do it. The discussion has been brought out, and it is just in accordance with my views.

Adjourned to 2 o'clock in the afternoon.

THURSDAY—AFTERNOON.

THE EXPERIMENT STATION AND ITS WORK.

By M. C. FERNALD, Pres. State College.

I have not prepared myself to take up the points in the history of this movement in any connective order, but for a number of years the matter has been under agitation. I think as many as six years ago I attended a meeting in Washington called for the consideration of this subject, and several times since that it has been agitated. Several bills have from time to time been presented to Congress and have undergone some modification, with the presentation of the "Hatch Bill" as the final form. This bill received favorable action upon the part of the Senate, being passed I think without any opposition and when it came into the House it received one hundred and fifty-two votes in favor of the bill and only twelve in opposition. Subsequent developments of the matter by the treasury officials have revealed the fact that no appropriation was carried with the bill and hence a special appropriation must be made before the station can be started. The money provided by the "Hatch Bill" is designed to enlarge the work of colleges and agricultural experiment stations in a special rather than a general way. That is, this money that is provided under the "Hatch Bill" is not designed to aid colleges. It doesn't give them a dollar more of funds for general purposes but does provide for specific work. The object of the endowment of the bill of 1862 was to provide institutions where instruction relating to agriculture and the mechanic arts should be the particular feature, and they would fulfill their mission if not a dollar was expended for experimental work on the farm. In our own State we have attempted to do work of this kind, and in many other States the colleges have responded to the demands of the people for work of this character, but as far as the original act was concerned its only object was to establish institutions where the young should be taught, and not for the immediate benefit of the farming community.

The act of 1887 is of an entirely different nature. It is not to aid colleges and thus carry out the original intent, but it supplements that work. The special object then of the "Hatch" fund may be said to be agricultural research and experiment and the dissemination of the results among the people, and this aim is a very important

one. Not only the researches shall be made and widely published but also the bill itself provides that there shall be a dissemination of the *results*, and this design is stated in the bill. It may be well at this point to read one or two clauses of the "Hatch Bill."

The last section indicates the nature of the work to be done, and in looking over the account of the meeting of the presidents of colleges and directors of experiment stations, recently held in Washington, I find there was a general plan of administration adopted, the outline of which I will read. This plan indicates the general sentiment of the meeting. There were those present who did not fully endorse the outline, but about seven-eighths of the delegates favored it. It represents the general thought of those who have given the matter consideration. The outline as presented by the committee is as follows:

"*First.* That all appropriations received under what is known as the "Hatch Bill," should be applied in good faith to agricultural research and experiment, and the dissemination of the results thereof among the people, and that any diversion of funds to the general uses of the colleges would be a direct violation of the plain spirit and intent of the law, and an inexcusable disappointment of just public expectation."

Here comes up the question as to whether, or not, an experiment station organized under the "Hatch Bill," should undertake the control of fertilizers. I have no doubt it will be so in this and many other States, but there were those who took the position that not one dollar of the money appropriated by the "Hatch Bill" should be used for that purpose, but that the money should be preserved for research and that work which can not be provided for in any other way. It is for the interest of the State to provide for fertilizer control, and let the State do it The general sentiment was that a certain amount might be used for that and the general objects for which the State stations have been established. In many of the States the stations have been continued and the $15,000 will be an additional fund for research and investigation.

"*Second.* That the experiment stations especially referred to should be so far separate and distinct from the colleges that it shall be possible at any moment to show any authorized inspector or investigator, that all the funds derived from the United States under the "Hatch Bill" have been expended solely for the purposes of agricultural experimentation according to the intent of the law."

While the station is not a part of the college, it is a part of the department of agriculture in the college. Nevertheless the funds for the work are to be so distinct that at any time it can be shown that every dollar appropriated under the "Hatch Bill" has gone for the purpose for which it was designed.

"*Third.* That every department of the station should be distinctly organized with its duties and control clearly defined, and with a recognized official head whose time shall be chiefly devoted to this department, who should be on an equal footing with the other heads of departments or professors of the college, and whose compensation should recognize the fact that the duties of the position occupy every month of the year."

"*Fourth.* That the publications of the station should be entirely separated from those of the college. The quarterly or more frequent bulletins should give their readers the results of experiments as fast as completed or as distinct chapters are completed. These bulletins enlarge on those practical points, such as the improvements or restoration of soils, the development of plants, and the breeding of stock, when suggested by work done, even to the extent of repeating well-known principles and facts when these need to be taught."

I do not understand the first sentence of this paragraph to mean that the publications must be entirely separate from those of the college where the station is located, but that they must form a distinct part of the report. This last section indicates the general plan of administration that resulted from the deliberations at Washington. There are stations that are already well equipped with buildings, apparatus, books, and men for carrying on the work of such a station in addition to their regular work. But few can do that, however, without increasing their force. Such a plan might be successfully operated at Cornell, but in most States that condition doesn't exist and it will be necessary to supplement with buildings, apparatus, with books and men, in order to do the legitimate work of the station.

Since the meeting at Washington in October, the State Institution of New York, Cornell University, has given the subject consideration and a plan has been adopted which I will indicate. Before doing so, however, I will read one or two extracts from the circular which has been published by the faculty of Cornell in regard to agricultural experiment stations. In this paper, mention is made of the office of the college as distinct from that of the station and this

act is therefore intended to supplement the act of 1862, and before the wants of the colleges can be met by the act of 1888, the acts under 1862 must exert their influence in one or more directions. First, they must educate young men for the duties of agricultural pursuits thus giving them the qualifications for teaching in the same branches of study. By this means there is indicated what agriculture has done, and there is still one other important method, by experimentation, and this bill comes in to supply that need. In the passage of this act, an effort was made to realize for this country the same benefits that in nearly all the countries of Europe have followed such experiments. In France, Great Britain, Belgium and several other countries of Europe the productions of the soil have been steadily increasing but owing to a general loss of fertility the average crop per acre has been steadily growing less. In some parts, for these reasons, agricultural pursuits have been abandoned. At the Washington meeting a member from Iowa stated that there had been a declination of from forty to twenty bushels an acre in all parts of the country. How shall we retain the fertility of the soil? How can we increase the fertility of the soil in all parts of the country? These are questions that cannot be well settled by the individual farmer because he cannot have time or money to make the experiments. Such matters can be satisfactorily answered only at institutions where the experiments can be successfully noted and published and thus render valuable service to the farming interests of our country as is being done by similar institutions in foreign countries. Then there are cited several subjects that may legitimately be considered by stations, and one of these of special importance is that of the contagious diseases of animals. One of the professors of Cornell, Professor James Law, has been called to Washington to take charge of the commission for the investigation of pleuro-pneumonia, and the commission has been entirely successfull in its efforts for the extirpation of the disease. Now, had Professor Law's recommendations so urgently made seven years ago been at that time heeded, the saving to the country would probably have amounted to not less than twenty to thirty millions of dollars. The diseases of animals can only be treated successfully with the aid of laboratories, and if this form of scourge is ever to be done away with it can only be through departments like this.

Having given this subject of control of the work of the station, deliberation at Cornell University, the following plan has been

adopted: The matter of the work of the station is to be placed under the direction of a council to consist of the president of the University, two members of the board of trustees, and the professors of the departments of agriculture, agricultural chemistry, veterinary science, botany and entomology. The council is also to include two other officers, a director of the station and a professor of horticulture.

I do not know whether in our State a similar body will be organized or not, for besides the president of the college, the director of the station and the professors of agriculture and natural history which we already have, two other officers must be chosen, a professor of horticulture and a professor of veterinary science. In reference to the equipment that is necessary we can only say that the nature of the research and experimentation must determine this point, and the nature of the research must be determined by necessity. This holds true as a general rule.

The equipments which are obviously needed whatever the works of the station may be are something as follows. First a building for offices and chemical work with appropriate fittings and apparatus. Then buildings and rooms are needed for biological investigation—the study of plant and animal life—and botanical rooms, a plant house, and rooms for veterinary investigation and entomological researches, also land and stock for experimental purposes. In connection with the latter there arises the question as to whether the farm at the State College better be turned over to the station for its management. I am not entirely sure that that would be the most advisable thing to do. It would be an easy way of disposing of the farm but we want the farm for the purposes of instruction. The work of the station in this direction is that of experimentation. A certain amount of stock and land will be needed for experimental purposes and investigation, and whatever is needed for such work should be set apart for that purpose. A certain amount of stock could be purchased from funds furnished by the "Hatch Bill" for special researches that would be needful in that line. I think the farm should not be handed over to the station but should remain under the control of the agricultural department of the college.

Then there would be needed also, whatever would be the work of the station, a generous supply of books. Quite a percentage of the first year's installment of the appropriation should go into books. It is necessary that the investigators should be fully informed. They

should have the literature on their subjects and this can come only by placing the literature into the libraries where it can be used. In the way of general apparatus there can be no mistake made in furnishing a generous supply of microscopes. You cannot do without them. Balances are necessary for laboratory work as you must have apparatus for measuring and weighing correctly. So in the way of additional equipment, besides rooms and the plant house which we have not but should have, and the buildings for chemical analysis, there would be needed all this apparatus for specific purposes which has just been mentioned and much more which would come up as the work advanced.

Problems for investigation can only be indicated generally by the bill, and you can hardly expect me to indicate them, for that is the province of the council of the experiment station. But in the way of general explanation or direction, I would say select those questions that are the most essential to the farmers of the State, and here is the point where the farmers can connect themselves with the work of the station and materially aid it. Use those problems that relate directly to the agriculture of the State.

Only conscientious work is of value. You cannot afford in a station to have any thing done in a haphazard way, but conscientious and accurate work is the only kind that is of any value whatever. All must be patient of the results. Questions that will come up for consideration cannot be settled in a day and we all need to be a little patient, and especially on the part of agricultural men, that the station may be helpful to the State. So that expectation should not be too much in the way of early and immediate results. I know that results that come from experimentation come slowly. The farmers of the State especially need to co-operate with the station in its management, for they want to make the station a blessing to themselves and to the State. I think it important that direction in that regard be made by the board.

CLOSING BUSINESS.

Mr. Harris of Cumberland, brought up the matter of the conflict in dates for the holding of annual exhibitions by agricultural societies located in so close proximity to each other as to interfere with the attendance and with the general success of the same, and suggested that the board of agriculture might be given the power to arrange

dates and thus avoid conflict. Other States do this and he could see no reason why the same plan would not work well here. On motion it was

Voted, That the committee having in charge the re-adjustment of the State stipend to agricultural societies be instructed to take this matter into consideration and report their conclusions at the next annual meeting of the board.

On motion of Mr. Fernald, thanks for courtesies were extended the several railroads, the Cony House, and Mr. Faught, clerk of the board.

Adjourned finally.

Z. A. GILBERT,

Secretary.

REVIEW OF THE YEAR.

The time covered by the records given in this report commenced on June 1, 1887, and ended June 1, 1888. The work of the Board of Agriculture, for the time has been conducted in the usual manner, and has been accompanied with a creditable measure of success. A larger number of institutes have been held during the year than in any year since the introduction of the present methods of work. In order to keep the expenditures for these institutes within the limit of the law the cost of a single meeting had to be of necessity reduced, and strict economy has been exercised in all directions to bring about this end.

Institutes have been held as follows:

Franklin county,	October 6th, at Rangeley.
	December 15th, at Strong.
Aroostoook county,	October 10th, at Presque Isle.
	October 12th, at Ashland.
Piscataquis county,	October 25th, at Parkman.
	October 26th, at East Dover.
Penobscot county,	October 27th, at Corinna.
	December 27th, at Brewer.
Somerset county,	October 28th, at St. Albans.
Oxford county,	November 1st, at Fryeburg.
	March 8th, at Hiram.
Waldo county,	November 8th, at Stockton.
	November 9th, at Morrill.
Sagadahoc county,	November 11th, at North Harpswell.
	March 16th, at Richmond.
Washington county,	November 16th, at Columbia Falls.
Kennebec county,	December 28th, at Clinton.
	December 29th, at Sidney.
Androscoggin county,	January 3d, at Turner.
Cumberland county,	January 4th, at Yarmouth.
	February 23d, at New Gloucester, in connection with State Pomological Society.
York county,	January 5th, at Hollis.
	January 6th, at Springvale.
Lincoln County,	January 24th at Whitefield.

Knox County,	January 26th at Rockland (stormy).
	March 7th at Rockland.
Hancock County,	March 1st at Penobscot.

In all, during the year, there have been held twenty-seven institutes, and at a cost of $1,370.43 or an average cost of $50.75 to a meeting. The secretary of the board has been in attendance and taken part at each of these institutes with the single exception of Hiram. To assist in the work aid has been called in from other States as follows: Prof. Geo. H. Whitcher, New Hampshire Agricultural College; Hon. Elbridge Cushman, member of Massachusetts Board of Agriculture; Dr. Geo. A. Bowen, member of Connecticut Board of Agriculture; Hon. P. M. Augur, Pomologist to the Connecticut Board, and G. M. Whitaker of the New England Farmer, Boston.

The more important of the lectures given and the papers read at these institutes are given in this report.

AGRICULTURE OF THE STATE.

The agriculture of the State at large nor any section of it can make any marked changes in a single year. The harvests of the year 1887 were characterized by full yields of hay and of corn and grain. The crop of potatoes, however, was a failure over a large part of the State, and throughout New England and the Middle States as well. There has been no such widespread failure of this crop before for many years. The cause was excessive rain accompanied with extreme heat through July and the first part of August causing rust and rot to widely prevail. Aroostook county was nearly exempt from this visitation, and two-thirds of a full crop were there harvested. The consequent high prices prevailing have enabled the farmers in that county to realize large cash returns for the crop, an advantage which is having a visible effect among the producers.

Fruit as a cash crop from the farm is still receiving special attention and the extension of orcharding still continues. The crop of 1887 was only one-fourth of that of 1886. Prices were steady and well sustained, and averaged two dollars and a half per barrel for first-class winter fruit. This gives the business a hopeful outlook.

The low price of beef continues. As a consequence the attention of farmers is being diverted from beef breeds and the production of beef and they are giving greatly increased attention to dairy stock and the production of butter.

The co-operative cream-gathering plan of butter making is now established on a substantial basis in our State and is rapidly on the increase. Much of the work the board has been called upon to do at the institutes has been to give information in regard to creamery butter making and the dairy business. Four new creameries have been put in successful operation during the past year and several more companies are organized for building the present summer. A list of the creameries in operation is here given.

CREAMERIES.

ACTON CREAMERY ASSOCIATION.

OFFICERS—*President*, John Lord; *Treasurer*, Jesse W. Sanborn; *Secretary*, Morris B. F. Dalton; *Operator*, A. Jackson Lord; *Selling Agent*, A. Jackson Lord. Amount of butter made during last year, 12 tons; average price received, 26 cents per pound; average cost of making and selling, 6 cents per pound; where marketed, Boston & Gloucester, Mass., Dover & Union, N. H., with quite a home market within 4 and 10 miles from the creamery.

REMARKS—This creamery made a good start in the beginning, as far forth as making a good grade of butter.

Their stock of cows was too limited at first but there has been a steady increase with a general satisfaction to the patrons. The butter made in this creamery commands the highest price in market and has a ready sale for all they can make, so much so that they have not always been able to fill their orders. Their prospect for this year is quite flattering at the present time and I have no doubt as to their ultimate success. All that is needed is a larger number of cows and these are increasing in a satisfactory manner. The patrons consider that last year was a success compared to their former way of dealing in the market.

Respectfully yours,

HORACE BODWELL.

FOXCROFT CREAMERY.

PROPRIETOR—C. C. Nichols; *Operator*, C. L. Swallow; *Selling Agent*, C. C. Nichols. Amount of butter made during last year, 30 tons; average price received about 24 cents; average cost of making and selling about 2½ cents; where marketed, Bangor, and Boston, and Moosehead lake, and Bar Harbor.

LELAND CREAMERY.

OWNERS—H. L. & C. H. Leland; *Operator*, C. H. Leland; *Selling Agent*, H. L. Leland; average price received, 25 cents; average cost of making and selling, three cents; where marketed, Bangor, mainly, some at Lewiston, Boston and local markets.

REMARKS—This is a proprietary creamery making up the product from four herds. A small quantity of cream was purchased through several of the fall months of 1887. The average make is from five to six hundred pounds monthly. The work has been very satisfactory inasmuch as it has removed the labor of manufacture from the household, and the numbers supplying cream being limited, all the conditions of success are easily kept under control.

H. L. LELAND.

LIVERMORE DAIRYING ASSOCIATION.

OFFICERS—*President*, D. A. Pollard; *Treasurer*, W. F. Fuller; *Secretary*, Theo. Russell; *Operator*, Theo. Russell; *Selling Agent*, G. B. Strickland. Amount of butter made during month of January, 3,977 pounds; average price received, 28 cents; average cost of making and selling, .038 cents; where marketed, Lewiston, Portland, Boston, New York, New Jersey and Philadelphia.

REMARKS—As our factory has been running less than a year and as I have been connected with it only since December, I have only given you the work of the make of the month just figured (January). We feel that our factory is now on good footing.

Respectfully yours,

THEO. RUSSELL.

MONMOUTH DAIRYING ASSOCIATION.

OFFICERS—*President*, H. M. Blake; *Treasurer*, H. O. Pierce; *Secretary*, H. O. Pierce; *Operator*, Geo. E. Delano; *Selling Agent*, E. A. Dudley. Amount of butter made per week, 250 pounds; average price received, 30 cents a pound; average cost of making and selling, 5½ cents a pound; where marketed, Boston.

REMARKS—Operations at this creamery commenced the last week in December, 1887. Owing to the fact that but few farmers were

in readiness the business so far has been light, but the prospect for next season is good.

We are making a first class article which finds a ready market at top prices.

NEW GLOUCESTER CREAMERY BUTTER COMPANY.

OFFICERS—*President*, Otis C. Nelson; *Treasurer*, A. C. Chandler; *Secretary*, M. R. Berry; *Operator*, M. R. Berry; *Selling Agent*, M. R. Berry. Amount of butter made during last year, 92,734 pounds; amount made per day (April 1), 330 pounds; average price received, 24 63-100 cents; average cost of making and selling, 4 13-100 cents; where marketed, Portland and Boston.

The following is a statement of receipts and expenditures for the year ending April 1, 1888:

Inches of cream received		185,469
Amount received from sales		$22,645 90
" paid patrons	$18,817 18	
" " for fuel	151 00	
" " " interest	240 00	
" " " collecting	1,380 58	
" " " making and selling butter	1,109 70	
Boxes, tubs, salt, ice, etc	747 44	
Power butter worker, new churn, cream tanks, etc	200 00	
	$22,645 90	

NORTH FAYETTE CREAMERY ASSOCIATION.

OFFICERS—*President*, C. Russell; *Treasurer*, Geo. Keith; *Secretary*, L. R. Fellows; *Operator*, Geo. Young.

REMARKS—Our creamery is to be started the first of April, am not able to state who will be the selling agent. That matter is not yet arranged, but is in the hands of the directors.

JOS. F. STEVENS.

POLAND DAIRYING ASSOCIATION.

OWNERS—Farmers and J. S. Briggs; *Treasurer*, J. S. Briggs; *Secretary*, J. S. Briggs; *Operator*, J. W. Mitchell; *Selling Agent*, J. S. Briggs. Amount of butter made during the last month, about

5,000 pounds; average price received, about 28 cents; average cost of making and selling, 6 cents; where marketed, Maine, Massachusetts and Rhode Island.

REMARKS—This factory was started in January, 1885, by a company of eight, but was dissolved in April, 1887, and has been run as at present since May 1, 1887. The cream increases some every month by the addition of new patrons, and each month looks better for the future. This section sells milk in Portland, and it will take longer for it to be pronounced a success than away from any railroad. We have not lost any patrons to speak of since last June.

We send a printed statement to each patron the first of every month, with check in full for previous month.

J. S. BRIGGS.

SABATTUS MOUNTAIN CREAMERY COMPANY, SABATTUS, MAINE.

OFFICERS—*President*, Alden Moulton; *Treasurer*, B. F. Dennison; *Secretary*, E. A. Ham; *Operator*, E. S. Dixon; *Selling Agent*, B. F. Dennison. Amount of butter made during last year, 39,078⅔ pounds; average price received, 26 2-11 cents; (average cost of making and selling 5 1-11. This includes *all* expenses of running the creamery;) where marketed, Maine, New Hampshire, and Massachusetts.

REMARKS—The business of last year was very satisfactory to the patrons and all concerned. The outlook for this year is still better as our business and trade is increasing every day. We are now (March 1st) making a little over 200 pounds per day and have a ready sale for it at 27 cents *at the creamery*. The cost for January this year including all expenses was 3 1-5 cents per pound.

B. F. DENNISON, *Agent.*

SKOWHEGAN JERSEY CREAMERY.

OFFICERS—*President*, C. J. Greene, Fairfield; *Treasurer*, Jas. F. Coffin, Skowhegan; *Secretary*, Jas. F. Coffin, Skowhegan; *Operator*, Geo. A. Humphrey; *Selling Agent*, Geo. A. Humphrey. Amount of butter made during last year, 51,000 pounds; average price received, 24 cents per pound; average cost of making and selling, five cents per pound; where marketed, greater part at Boston.

REMARKS—The above is a list of the officers for the present with an estimate of the business done for the past year. The creamery was leased to me and I paid an agreed price for the cream during the year, which has given patrons better satisfaction than on the old plan.

GEO. A. HUMPHREY.

ST. ALBANS.

Proprietor, Isaac O. Winslow. Amount of butter made during last year, 131,413 pounds; average price received, 26½ cents; average cost of making and selling, 4½ cents; where marketed, Boston, Providence, Bangor, Bar Harbor and Old Orchard.

REMARKS—Cost of making and selling includes freight and commissions, which latter is paid on a portion.

TURNER CENTRE DAIRYING ASSOCIATION.

OFFICERS—*President*, P. C. Bradford; *Treasurer*, L. P. Bradford; *Secretary*, G. B. Bradford; *Operator*, E. L. Bradford; *Selling Agent*, Board of Directors. Amount of butter made during last year, 168,051 pounds; average price received (by patrons), 22 cents net; average cost of making and selling, 3½ cents; where marketed, Maine and Massachusetts.

The following is a report of the business for the year, 1887:

Total receipts	$43,309 10	
Paid patrons	37,017 44	
Reserved for the company		$6,291 66
Expenditures		6,129 15
Gain in treasury for 1887		162 51
Received for butter sold		42,491 32
Received for buttermilk sold		437 64
Received for cream sold		71 44
Paid for collecting cream		1,684 54
Labor at factory		1,195 51
No. inches of cream collected		336,490
No. inches of cream sold (estimated)		400
No. inches cream made into butter		336,090

Pounds of butter made, 168,051, or a little over 84 tons. No. inches cream per pound butter, 2. Cost per pound of butter for collecting cream, $.01. Cost per pound butter for labor at factory,

$.0071. Average price per pound received for butter sold, $.25¼. Average price per pound paid patrons, $.22. Total expense per pound, $.0357.

WALDO COUNTY JERSEY CREAMERY.

Owned by the Monroe, Winterport & Frankfort Butter Association.

OFFICERS—*President*, Freeman Atwood, Monroe; *Treasurer*, E. H. Nealley, Monroe; *Secretary*, E. H. Nealley, Monroe; *Operator*, C. L. Berry; *Selling Agent*, C. M. Conant, Winterport, post-office Monroe. Amount of butter made during last year, about 40,000 pounds (There was made from March 7, '87 to January 1, '88, 36,273 pounds); average price received, 25 cents; average cost of making and selling, 4.64-100 cents; where marketed, Boston, Bar Harbor and Bangor.

REMARKS—This association commenced making butter under quite unfavorable circumstances one year ago last June. When it started they had the cream from about 225 cows and made quite a good showing considering it was late in the season (June 16th). Last season up to January 1, '88, about 350 cows furnished cream and the patrons have, in most cases, been well satisfied with the result. The outlook the coming season is more favorable and probably 500 cows will be pledged. What our factory wants is more winter cream and what they must have to make it a paying institution. We have a first-class factory and in a location where the cream of 1,000 cows could easily be furnished if the farmers would interest themselves in the matter.

WEST PARIS CREAMERY BUTTER COMPANY, WEST PARIS, MAINE.

OFFICERS—*President*, A. J. Abbott, North Paris; *Treasurer*, L. B. Andrews; *Secretary*, A. J. Curtis; *Operator*, A. J. Abbott; *Selling Agent*, A. J. Curtis. Amount of butter made during last year for eleven months, 41,000 pounds; price received, from 20 to 30 cents per pound; cost of making and selling, from 3¾ to 5½ cents per pound; where marketed, three-fourths in Boston, balance home trade.

REMARKS—The amount made in the winter has been quite small. If we could have quite a little more cream, say all that the maker

could handle, the cost of making would be no more and it would reduce the cost per pound and give better returns. The month of January, we made a little over twenty-one hundred pounds, at a cost of about 5½ cents per pound for making and selling. Think we will have a large increase next winter, as the farmers are well pleased with the returns and are trying to get their cows to come in more in the fall. A. J. ABBOTT.

WINTHROP JERSEY CREAMERY.

DIRECTORS—A. D. King, R. Alden, B. C. Chandler and J. E. Brainerd; *President*, A. C. Carr; *Treasurer*, Levi Jones; *Secretary*, Elliott Wood; *Operator*, J. R. Remick; *Selling Agent*, J. R. Remick. Amount of butter made during last year, no means of exactly knowing myself, but judge about 52,000 pounds or an average of 1,000 per week; average price received since last December 1st, 28½ cents per pound; average cost of making and selling, 5 cents per pound, not including freight and express bills, but delivered at depot or express; where marketed, mostly in Boston, all in Massachusetts.

REMARKS—Last November only cream enough was received to make about 2,100 pounds per week. I was employed to take the entire charge of all the business connected with the factory. Now we are making about 1,400 pounds weekly, and I don't know of any dissatisfaction. We are steadily increasing and when cold weather comes again we shall take cream from more territory than ever before in the history of this factory. J. R. REMICK.

BUCKFIELD CREAMERY.

OFFICERS—*President*, H. D. Irish; *Treasurer*, C. H. Prince; *Secretary*, Alfred Cole; *Operator*, A. F. Tilton; commenced making butter December 15, 1887.

MACHIAS CREAMERY—NO RETURNS.

AGRICULTURAL SOCIETIES.

The exhibitions of the different agricultural societies of the State were in a high degree successful. Plainly, the influence of the work of these societies in promoting the interests of agriculture is on the increase and the State should give them generous encouragement. In accordance with the law providing for it an exhibit of their financial standing and of their transactions is here given.

OFFICERS OF AGRICULTURAL SOCIETIES.

Societies.	President.	Post Office.	Secretary.	Post Office.	Treasurer.	Post Office.
State Agricultural	Rufus Prince	South Turner	A. L Dennison	Portland	B. F. Briggs	Auburn.
Eastern Me Fair Association,	J. P. Bass	Bangor	E. L. Stearns	Bangor	E. B. Neally	Bangor.
Maine State Pomological	Charles S. Pope	Manchester	D. H. Knowlton	Farmington	A. S. Ricker	Turner.
Androscoggin	D. P Field	Auburn	E G. Woodside	Lewiston	David Farrar	Lewiston.
Aroostook	John Stewart, Jr.	Houlton	Ira J. Porter	Houlton	Wm. Donavan	Houlton.
Aroostook, North	G. M. Park	Presque Isle	Fred S. Wiggin	Maysville Center.	J. W. Bolton	Presque Isle.
Aroostook, Madawaska	Luc Albert	Madawaska	Alexis Cyr	Madawaska	Jean Cyr	Madawaska.
Aroostook, Van Buren	Ambrose Violette	Van Buren	Joseph Martin	Van Buren	Simeon Cyr	Hamlin Pl.
Cumberland	W. W. Harris	Cumberland Cent.	J. J. Frye	Portland	J. J. Frye	Portland.
Franklin County	Wm. B Gilman	Farmington Falls	E. A. Hall	Chesterville	P. P. Tuffts	Farmington.
Franklin, North	M. C. Kelley	Phillips	M. S. Kelley	Phillips	F. H. Wilbur	Phillips.
Franklin, Central	J. M. Lambert	Strong	E J. Gilkey	Strong	Adam Hunter	Strong.
Kennebec County	J. H. Moore	Winthrop	H. O. Nickerson	Readfield	C. H. Stevens	Readfield.
Kennebec, North	S. I Abbott	Waterville	A. S. Maxwell	Waterville	C. G. Carlton	Waterville.
Knox County	Fred H. Berry	Rockland	R G. Crie	Rockland	J. A. Tolman	Rockland.
Knox, North	C. R. Morton	Union	A. M. Wingate	Union	N. K Burkett	Union.
Lincoln County	Ezekiel Ross	Newcastle	E. W. Dunbar	Damariscotta	Ephraim Taylor	Newcastle.
Oxford County	H L Horne	Norway	A. C T. King	South Paris	A. C. T. King	South Paris.
Oxford, West	*A. O. Pike	Fryeburg	B W. McKeen	Fryeburg	W. R. Tarbox	Fryeburg.
Penobscot County	A. G. Kent	Brewer Village	B. A. Burr	Bangor	B. A. Burr	Bangor.
Penobscot and Aroostook	Isaac Cushman	Sherman Mills	L. B. Rogers	Patten	S. W. Robbins	Patten.
Penobscot, West	John Rogers	Stetson	T. P. Batchelder	Kenduskeag	T. P. Batchelder	Kenduskeag.
Penobscot, North	Nathan Averill	Lee	S. R. Ludden	Lincoln	F. M Johnson	Lee.
Penobscot, Central	Ira W. Davis	Corinth	Chas. Megguire	Corinth	Frank Spratt	Corinth.
Piscataquis, East	S. D. Millett	Milo	M. L. Durgin, Jr	Milo	M. L. Durgin, Jr	Milo.
Piscataquis, Central	A. M Robinson	Dover	B. F. Hammond	Foxcroft	B. F. Hammond	Foxcroft.
Piscataquis, West	Frank Hart	Howard	J F. Thombs	Monson	J. F. Thombs	Monson.
Sagadahoc	C. E. Townsend	Brunswick	I. E Mallett	Topsham	Lyman E. Smith	Brunswick.
Somerset, East	C. M. Jewett	Hartland	P. K. Taylor	Hartland	G. M. Burleigh	Hartland.
Somerset, Central	R. B Shepherd	Skowhegan	A. R. Smiley	Skowhegan	A. R. Bixby	Skowhegan.

Somerset, West	Geo. Flint	North Anson	Benj. Moore	North Anson	Benj. Moore	North Anson.
Waldo County	S. A. Payson	Belfast	M. A. Wadlin	Belfast	A. S. Redman	Belfast.
Waldo and Penobscot	F. Atwood	Monroe	E. H. Neally	Monroe	F. L. Palmer	Monroe.
Waldo, North	Frank Lane	Unity	J. H. Cook	Unity	H. B. Rice	Unity.
Washington County	Nelson S. Allan	Dennysville	H F. Porter	Pembroke	Peter E. Vose	Dennysville.
Washington, West	Jas. L. Bucknam	Columbia Falls	E. F. Allen	Columbia Falls.	F. L Allen	Columbia Falls.
Washington, Central	J. C. Talbot	East Machias	W. H. Phinney	East Machias	M. Gardiner	Machias.
Washington, North	Oscar Pike	Princeton	W. R Dresser	Princeton	S. G. Spooner	Princeton.
York County	D. A. Burnham	Biddeford	A. L Ricker	Biddeford	G. H. Boothby	W Scarboro.
York, Buxton and Hollis	C. Roberts	South Hollis	Ira W. Milliken	Hollis	E. T. Roberts	South Hollis.
York, Shapleigh and Acton	John Lord	Acton	H. Bodwell	Acton	H. A. Stanley	Shapleigh.
York Ossipee Valley Assoc'n,	B. F. Pease	Cornish	Jas C. Ayer	Cornish	Howard Brackett	Corinth.

* Deceased.

FINANCIAL STATEMENT OF AGRICULTURAL SOCIETIES FOR THE YEAR 1887.

	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	$500 00	–	–	–	–	–	–	–	–	–	–	–	–	–
Androscoggin	400 00	$9727 26	$1327 26	$1603 00	$854 92	$2455 90	–	–	–	$63 00	$41 00	$38 00	$41 00	$25 00
Aroostook	110 00	638 57	745 57	460 87	255 19	717 13	–	–	–	18 00	3 00	1 50	18 00	11 50
Aroostook, North	262 00	1202 84	1464 84	793 25	436 97	1230 22	$1022 90	$400 00	–	34 71	11 50	15 50	24 00	32 78
Aroostook, Madawaska	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Aroostook, Van Buren	–	42 00	43 00	36 75	5 00	41 75	–	–	–	60	1 25	95	1 20	1 95
Cumberland	400 00	3998 78	4398 78	1091 50	1537 48	2628 98	1200 00	–	–	51 00	50 00	14 00	82 00	7 00
Franklin County	92 00	1611 84	2426 29	810 45	125 00	2494 29	4000 00	600 00	–	24 50	4 50	27 00	20 00	21 25
Franklin, North	80 00	631 82	711 82	391 40	165 00	686 82	1155 17	461 40	–	12 00	35 00	25 50	13 00	8 00
Franklin Central	10 00	83 00	103 00	50 65	19 57	70 22	450 00	400 00	–	2 00	9 50	3 00	2 00	90
Kennebec County	300 00	1788 80	2088 80	922 33	841 18	1763 53	1000 00	226 84	–	15 00	20 00	16 00	24 00	36 75
Kennebec, North	100 00	260 56	360 56	391 24	97 98	489 22	3000 00	1672 21	–	11 00	8 00	18 00	18 00	27 00
Knox County	174 00	762 96	936 96	736 00	367 87	1103 87	25 00	–	–	7 00	19 00	1 50	34 00	22 00
Knox, North	147 00	557 16	704 16	378 45	314 25	792 70	200 00	–	–	17 50	48 50	23 75	10 00	18 50
Lincoln County	248 00	865 20	1112 20	427 34	347 83	1115 17	1350 00	775 00	–	12 00	6 00	3 00	9 50	3 00
Oxford County	175 00	4991 50	5166 50	1741 50	2001 19	4637 24	7500 00	1824 75	–	136 00	104 00	127 00	107 00	126 00
Oxford, West	157 00	2600 00	2757 00	866 70	550 00	3915 00	5400 00	2500 00	–	17 50	18 00	35 50	6 00	31 50
Penobscot County	35 00	168 44	203 50	101 00	47 19	163 19	–	–	–	2 25	3 00	4 75	4 25	–
Penobscot and Aroostook	97 00	38 00	–	67 25	21 50	88 75	–	–	–	6 00	5 00	4 05	8 00	5 00
Penobscot, West	331 00	1281 23	1612 23	801 25	1056 74	1857 99	2000 00	–	–	26 00	31 00	23 00	29 00	30 75
Penobscot, North	34 00	185 35	219 25	183 95	38 98	222 91	–	–	–	1 75	11 50	5 00	4 25	4 00
Penobscot, Central	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Piscataquis, East	20 00	44 00	64 00	57 75	20 00	77 75	–	–	–	2 50	6 50	2 50	3 00	3 50
Piscataquis Central	108 00	608 44	716 44	364 10	236 58	600 68	–	–	–	6 00	30 00	5 50	19 00	5 50

Piscataquis, West	20 00	85 79	105 79	62 80	30 00	92 80	10 00	40 00	-	1 50	12 00	3 25	3 00	1 50
Sagadahoc	264 00	2892 84	3156 84	1531 28	1527 52	3058 78	5000 00	-	-	20 50	115 00	60 50	49 00	45 00
Somerset, East	133 00	1072 14	1205 14	704 60	513 83	1218 43	2500 00	-	-	22 25	21 00	35 75	22 50	15 25
Somerset, Central	190 00	1432 47	1622 47	969 10	675 27	1644 37	4200 00	21 90	-	41 00	77 00	39 50	41 00	78 00
Somerset, West	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Waldo County	134 00	805 25	939 25	826 00	20 00	870 00	2450 00	-	-	13 00	10 50	20 00	28 50	30 00
Waldo and Penobscot	130 00	1901 29	2031 29	1058 40	820 50	1878 90	2500 00	-	-	46 00	50 00	15 00	33 00	25 50
Waldo, North	90 00	522 64	612 64	504 75	120 27	625 02	-	-	-	12 00	24 00	12 25	12 00	14 25
Washington County	160 00	1223 69	1383 69	885 80	491 27	1357 07	1900 00	-	-	26 25	10 00	14 00	17 00	30 00
Washington, West	130 00	-	2052 66	1042 06	466 87	1508 93	500 00	-	-	34 00	19 00	26 00	23 00	21 00
Washington, Central	110 00	1197 64	1307 64	837 25	374 44	1061 69	-	325 00	-	26 00	27 00	22 00	38 00	32 50
Washington, North	-	619 89	619 89	334 60	385 29	719 89	900 00	400 00	-	19 50	-	19 00	15 00	18 50
York County	244 00	1244 99	1488 99	1106 60	385 57	1492 17	-	-	$11 00	11 50	66 00	11 00	7 50	15 00
York, Buxton and Hollis	100 00	622 00	722 00	290 15	293 84	583 99	1200 00	-	-	6 50	39 00	14 50	10 00	6 00
York, Shapleigh and Acton	56 00	319 00	375 00	366 00	10 00	381 50	5000 00	-	3 00	8 25	42 00	10 00	8 00	6 25
York Ossipee Valley Association	200 00	2209 39	2409 39	819 00	1177 23	1921 40	4800 00	1000 00	-	27 00	93 00	46 00	71 00	38 00

FINANCIAL STATEMENT OF AGRICULTURAL SOCIETIES FOR THE YEAR 1887—*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 Pomological..	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Androscoggin.....	10 00	890 00	25 00	12 00	32 00	23 00	12 00	52 00	305 00	69 00	40 50	1 00	7 00	18 50	10 50	1 00	3 00	1 00	11 50	1 50
Aroostook	–	286 50	21 00	6 00	33 50	8 50	4 00	5 50	70 00	60 50	75	50	–	–	–	–	50	–	2 50	75
Aroostook, North.	–	483 50	12 50	11 00	54 80	–	15 50	2 00	136 00	74 30	2 00	1 50	–	–	1 50	–	3 00	–	1 25	–
Aroostook, Madawaska.....	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Aroostook, Van Buren.....	1 05	–	1 75	2 25	8 80	2 10	1 30	–	10 40	12 80	–	40	–	–	90	–	50	–	1 45	–
Cumberland.....	–	632 57	24 00	8 00	36 00	8 00	43 00	11 50	246 00	68 00	2 00	1 00	–	1 00	1 00	–	3 00	1 00	2 00	–
Franklin County.....	9 50	200 00	13 50	6 00	23 50	7 00	48 25	6 55	283 00	43 00	55	–	–	–	–	–	–	–	3 35	20
Franklin, North	5 00	170 00	7 75	8 00	15 15	5 00	10 50	3 20	115 75	30 90	4 00	–	–	1 00	–	–	1 50	–	4 00	40
Franklin, Central.....	1 25	6 50	2 25	1 75	9 00	–	2 55	–	18 65	6 50	1 00	–	–	–	–	–	–	–	75	–
Kennebec County	17 50	210 00	16 00	6 00	292 50	12 00	19 50	10 10	287 35	103 00	37 25	6 00	–	5 00	–	–	–	–	75	–
Kennebec, North.....	8 00	115 00	15 00	6 00	32 00	4 00	13 00	10 00	122 00	53 00	5 00	–	–	–	–	–	–	–	–	–
Knox County	8 00	385 00	14 00	5 00	39 75	4 00	12 00	26 00	133 50	58 75	4 25	50	50	50	50	–	1 50	1 00	4 50	50
Knox, North.....	9 00	–	3 00	3 00	29 50	6 50	13 45	7 75	164 95	35 50	7 25	75	–	75	50	–	50	50	4 50	1 25
Lincoln County	6 00	140 00	28 00	5 00	13 00	7 25	5 50	3 50	55 75	46 00	10 75	–	–	–	8 00	–	2 00	50	1 50	50
Oxford County.....	10 00	574 05	59 00	27 00	56 00	23 00	51 00	10 00	746 00	142 00	12 50	5 00	–	3 00	3 00	–	–	–	4 00	1 00
Oxford, West.....	14 75	388 50	9 00	6 50	46 50	9 00	13 00	9 00	254 75	52 50	8 00	–	–	–	–	–	2 00	–	6 75	–
Penobscot County.....	3 00	–	9 00	–	–	–	11 50	3 75	–	–	1 00	–	–	1 00	25	–	–	–	4 00	1 00
Penobscot and Aroostook...	–	16 00	2 00	3 00	19 75	2 00	5 00	1 00	–	–	50	–	–	–	–	–	–	50	50	50
Penobscot, West.....	3 00	330 00	21 50	6 00	35 00	12 00	13 00	11 25	179 00	62 50	7 50	1 00	–	–	1 65	75	2 25	1 75	3 20	–
Penobscot, North.....	2 00	103 00	4 50	1 75	16 25	–	4 50	3 25	36 25	22 25	75	–	–	25	25	–	25	25	25	25
Penobscot Central.....	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Piscataquis, East.....	–	5 00	3 00	3 00	13 50	–	2 00	2 25	20 00	19 00	75	–	–	–	–	–	–	–	–	75
Piscataquis Central.....	–	170 00	10 00	12 00	37 50	10 00	4 50	3 00	96 50	160 00	75	50	50	–	–	–	–	–	–	–

Piscataquis, West.....	–	–	3	00	1	25	13	75	–	–	1	50	21	25	18	00	40	–	–	–	–	–	–	–	25	10
Sagadahoc.....	11	00	590	00	14	00	10	00	70	00	11	00	25	00	48	75	399	75	94	00	8	75	–	1	50	1	75	2	50	1	00	3	50	1	00	10	50	75
Somerset, East.....	6	00	460	50	9	00	10	75	25	00	–		15	25	–		147	00	35	75	–		–			–			–			–			–		–
Somerset, Central.....	9	00	400	00	54	50	20	00	52	50	8	00	28	50	14	00	336	00	127	00	1	50	–			–			–			1	25		–	2	50	50
Somerset, West.....	–	–	–		–		–		–		–		–		–		–		–		–		–			–			–			–			–		–
Waldo County	4	00	320	00	14	50	10	50	35	00	4	00	–		5	00	135	00	60	00	12	00	–			–			–			–			–		–
Waldo and Penobscot.....	23	00	525	00	32	00	7	00	57	00	12	00	20	50	21	00	246	00	96	00	7	50	2	00	–	1	00	1	50	–	1	50	1	50	6	75	1	50
Waldo, North.....	9	00	208	00	12	00	6	00	24	00	1	75	10	25	3	25	98	75	61	25	6	00	3	00	1	50	2	00	1	00	–	7	00	–		3	50	1	25
Washington County	9	00	450	00	17	00	24	00	42	00	15	00	7	00	25	50	171	75	83	00	4	50	1	75	–	2	25	2	25	1	75	5	50	1	00	18	25	2	25
Washington, West.....	–	375	00	65	00	9	00	20	00	13	00	8	00	13	00	157	00	104	00	5	00	3	50	–	5	00	5	00	50	3	50	5	00	24	90	4	35
Washington Central.....	–	410	00	23	00	13	00	20	00	22	00	14	00	18	50	200	00	56	00	2	25	–		–		–		–	6	50	1	00	8	25	–	
Washington, North.....	–	140	00	9	00	6	00	21	00	8	00	6	00	8	75	94	75	36	00	75		–		–		–		–		75	75	4	00	75			
York County.....	6	00	610	00	–		6	00	18	00	6	00	6	00	35	00	224	00	36	00	1	00	1	00	1	00	1	00	–	–	1	00	–		1	50	75	
York, Buxton and Hollis..	3	00	110	00	8	00	5	00	8	00	–		3	00	4	50	78	50	21	00	1	50	–		–	–		–		1	50	–		75		–	
York, Shapleigh and Acton,	6	00	80	00	–		3	50	28	50	14	00	8	50	6	00	114	00	32	00	5	00	2	50	2	50	2	50	2	50	–	7	50	2	50	1	50	1	50
York Ossipee Valley Ass'n..	3	00	315	00	14	00	9	00	45	00	7	00	12	00	2	00	299	00	67	00	3	00	3	00	–			–		–		–		2	00	–		

Financial Statement of Agricultural Societies for the Year 1887—*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 Pomological,	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Androscoggin	3 00	1 50	3 00	1 50	104 50	47 00	82 25	10 00	30 00	5 00	33 00	–	34 50	–	16	21	20	14	28	18	18	135	51	15	14	–
Aroostook	1 50	–	75	–	8 25	1 75	7 25	2 90	8 00	–	11 70	–	4 22	–	5	12	18	3	1	2	–	44	111	11	15	29
Aroostook, North	2 50	2 75	25	–	14 75	–	22 50	6 25	–	10 25	14 25	–	–	30 25	18	31	35	13	4	11	–	127	129	26	–	30
Aroostook, Madawaska	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Aroostook, Van Buren	50	65	65	40	5 45	–	–	–	1 00	–	5 85	1 25	–	–	2	6	6	3	2	4	5	28	25	3	10	–
Cumberland	50	1 00	10	1 00	13 50	–	10 00	1 00	18 00	–	–	–	–	–	14	25	6	6	7	6	4	68	18	27	2	30
Franklin County	20	35	35	20	15 80	–	17 70	3 55	10 00	25 50	21 90	2 75	8 00	20 00	23	18	34	8	50	53	16	305	98	100	4	45
Franklin, North	40	40	1 40	–	12 10	80	7 80	1 80	4 25	–	26 35	2 00	–	2 60	10	28	20	8	34	22	13	201	72	97	36	30
Franklin, Central	60	50	50	35	3 60	1 50	2 25	30	80	–	12 30	–	–	1 00	4	12	20	5	20	30	10	106	50	36	7	–
Kennebec County	3 00	1 50	3 00	–	56 50	–	54 50	7 40	45 50	5 00	65 25	–	–	–	15	30	45	14	65	41	50	260	121	50	61	110
Kennebec, North	–	–	–	1 00	5 00	–	25 00	–	15 00	–	10 25	–	–	–	5	13	18	3	2	7	4	52	64	68	23	40
Knox County	50	1 50	1 00	4 50	21 25	20 00	28 75	5 50	10 00	1 00	34 55	2 00	–	35 70	10	32	20	3	5	1	4	75	36	28	9	75
Knox, North	3 00	–	1 25	1 25	21 50	10 80	32 45	1 30	15 00	–	51 25	–	–	45 70	19	13	23	3	29	24	12	176	64	30	41	55
Lincoln County	50	50	1 00	1 00	23 25	4 50	33 75	3 50	3 75	2 00	34 85	1 75	–	60 09	13	11	7	4	8	5	5	63	75	14	11	61
Oxford County	1 00	50	50	50	43 75	–	6 00	7 30	22 00	19 25	36 10	31 25	3 40	129 65	41	43	72	19	57	60	10	499	67	170	50	199
Oxford, West	50	50	–	–	17 75	4 75	21 00	9 25	16 50	12 50	55 95	–	–	53 25	10	18	9	10	33	21	8	104	41	32	10	40
Penobscot County	2 00	3 00	4 00	5 25	19 25	–	12 00	–	4 00	–	10 50	–	–	10 85	–	–	–	–	–	–	–	–	–	–	–	–
Penobscot and Aroostook,	1 00	50	50	–	4 00	–	4 50	–	1 00	–	12 25	4 50	–	–	3	5	14	1	3	8	–	34	33	20	4	10
Penobscot, West	90	–	1 20	–	26 20	6 00	24 68	7 70	34 50	5 50	58 45	2 00	15 75	55 00	24	34	39	20	19	21	1	158	119	40	30	48
Penobscot, North	25	–	50	25	3 25	50	5 00	75	6 25	–	7 25	–	–	1 40	3	9	9	2	15	9	–	79	47	14	–	37
Penobscot, Central	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Piscataquis, East	75	–	50	–	2 75	1 25	50	–	2 50	–	2 00	–	–	–	3	2	7	–	3	4	–	26	27	6	–	12
Piscataquis Central	–	–	–	1 75	–	–	14 75	2 00	3 75	–	9 85	–	4 00	10 00	6	20	9	4	10	3	–	65	85	24	6	40

Piscataquis, West		10		10		10		10	1	15	1	10	1	25		40	2	00	–	1	40	1	00	–	15	25	5	24	10	1	19	18	–	114	50	–	–	12
Sagadahoc	1	25	4	75	3	25	1	75	103	25	–		56	00	6	50	25	00	7	75	31	85	9	50	41	25	166	41	8	40	41	14	40	32	8	327	65	57	11	148
Somerset, East		–		–		–		–		–			6	80	–		15	75	–		29	05	–		–		9	95	14	32	18	7	13	12	9	105	79	44	–	–
Somerset, Central		75	1	50		75	1	00	9	75	7	75	18	85	1	00	13	50	–		10	75	9	00	6	00	29	50	20	27	51	13	54	33	6	291	119	68	17	90
Somerset, West		–		–		–		–		–		–		–		–		–	–		–		–		–		–	–	–	–	–	–	–	–	–	–	–	–
Waldo County		–		–		–			60	00		–	18	50	3	70	4	00	–	30	00		–		–		15	00	10	20	18	8	5	10	2	73	60	20	10	30
Waldo and Penobscot	3	00	1	50	2	00	1	50	31	25	6	00	24	00	1	50	6	00	–	191	00		–		–		22	65	19	16	12	7	14	8	12	106	68	39	16	200
Waldo, North	1	25	1	25	1	25	1	25	30	25	3	75	11	75	4	75	6	00	–	22	25		–	2	00	6	00	70	12	10	4	30	12	6	184	55	72	2	40
Washington County	2	25	4	50	3	25	2	25	49	50	27	00	21	65	3	75	10	25	–	55	90	8	25		–	4	75	20	24	19	13	8	8	12	120	45	30	39	90
Washington, West	8	40	3	25	5	40	1	65	87	20		–	28	05	3	00	12	00	–	60	00	5	50	13	75	2024	61	16	5	15	5	7	14	–	77	43	2	17	30
Washington, Central	2	00	1	75	1	25	1	50	31	30	6	80	14	00	2	25	6	50	–	63	15	10	75	6	00		–	8	11	19	3	14	12	–	65	39	12	22	117
Washington, North	1	50		–		75		–	9	25	3	50	4	70		–	2	25	–	16	60		–		–	27	55	12	6	12	7	4	8	–	61	31	14	25	47
York County		–	1	50	1	50	1	00		–	11	00	8	50		50	6	00	–	129	35		–		–	59	00	9	4	9	5	13	7	4	191	60	12	11	100
York, Buxton and Hollis		50		25		–		–	4	50	3	25	6	65	1	50	2	50	–	51	60		–		–	10	65	6	18	12	4	34	24	2	160	24	5		45
York, Shapleigh & Acton	1	50	1	50	1	50	1	50	34	50	23	75	22	75	6	00	7	50	–	31	00		–		–	15	00	7	23	13	4	53	15	3	189	32	38	16	52
York Ossipee Valley Ass'n		–		–		–		–	8	00	5	00	15	00	2	00	6	00	–	59	00		–		–	14	00	26	41	23	12	52	48	30	332	54	18	21	17

MAINE STATE AGRICULTURAL SOCIETY.

The Maine State Agricultural Society held its annual exhibition on the State Fair Park at Lewiston, September 6–7–8–9, 1887. The receipts and expenditures, together with an exhibit of the financial standing of the society, are here given.

Treasurer's Report of the Receipts and Expenditures of the Maine State Agricultural Society from January 28th, 1887, to May 1st, 1888.

RECEIPTS.	
From H S. Osgood, balance	$1,439 43
Tickets	17,269 53
Entry fees	2,200 00
Land rent	1,459 83
Space in halls	118 50
Check-room	110 10
Water rent	58 50
Life member fees	40 00
Premium returned	5 00
State appropriation	1,000 00
Sale of score cards	143 16
H. S. Osgood	100 00
C. H. Weymouth, work done outside park	46 00
R. Prince	2 00
Borrowed on treas. notes	11,000 00
	$34,992 05
EXPENDITURES.	
For Premiums	9,088 25
Labor	2,263 78
Straw	423 10
Police	192 00
Boarding help	315 57
Supplies	392 40
Trucking	20 00
Salaries	1,700 00
National Trotting Association	56 00
Poultry coops (bought in 1885)	316 25
Books and stationery	63 16
Insurance	108 00
Plumbing in 1886	235 00
Fixtures for lights	47 25
Printing and advertising	620 00
Ice for 1886 and 1887	36 29
Lewiston Brig. Band	200 00
Maine State Pomological Society	450 00
Building	25 00
Grand stand	8,000 00
Notes and interest	8,762 02
Prize ribbons and cards	58 02
" cups	108 00
Postage and telegrams	96 46

EXPENDITURES—CONCLUDED.

For A. L Dennison, error in former settlement	$100 00
Lumber	915 02
Sleds	35 00
Expert judges	135 59
Base ball games	55 00
Auditing H S. Osgood's account	12 00
Cash on hand	162 89
	$34,992 05

B. F. BRIGGS, *Treasurer.*

Financial Standing of Society.

ASSETS.	
Land purchased at sundry times	$12,650 00
Exhibition building	8,500 00
Dormitory "	1,500 00
Poultry "	1,300 00
Offices at gate	800 00
Stable	400 00
Forage stable	300 00
Ladies' dressing-room	250 00
Check-room	200 00
Police-station	150 00
Four ticket offices	300 00
Office Sup't Horse Dep't	200 00
Judges' stand	300 00
Boiler house	200 00
Rentable buildings	75 00
Grand stand	8,000 00
341 cattle stalls	3,410 00
337 horse stalls	8,425 00
140 sheep and hog pens	500 00
Water pipes	1,000 00
45-horse-power engine	450 00
One 50-horse-power boiler	1,000 00
Track machine	150 00
Sprinkler	150 00
Plows, harrows, drags, sleds, carts, &c	322 50
Hay scales	175 00
Elevator	200 00
Hen coops with fixtures	425 00
Chairs, tables, stools, &c	105 00
Shafting, pullies and belting	775 00
Rubber hose	12 00
Butter refrigerator	100 00
Pr work horses	400 00
Lumber, tools, furniture, &c	500 00
	$53,224 50
LIABILITIES.	
Cash loans	36,000 00
Bills payable (estimated)	500 00
	$36,500 00
Assets exceed liabilities	16,724 50

B. F. BRIGGS, *Treasurer.*

AUBURN, May 1st, 1888.

LECTURES AND PAPERS.

AGRICULTURAL SOCIETIES.

By D. W. CAMPBELL, Member for Washington County.

I have chosen to speak to you of agricultural societies because they are a means for the advancement of agriculture, already wisely planned and organized for their work; because I think many new features can be introduced during the year and at their annual exhibitions to keep pace with the demands of the times; and finally, because I have been connected with them for some years, and have had good opportunities of studying them.

I represent a part of the State where they are highly prized, and where we wish to make the most of them, as being *our* link in the chain that unites us in a common cause, and the principal evidence and vehicle of the State's interest in communities comparatively isolated. Their stipends form a considerable portion of the money given to agriculture, and being given conditionally and in proportion to the amount expended in specified ways by the societies make their outlay a matter of interest to *all*, and especially to those who would show their appreciation of the State's efforts in this direction. Their present relations to the State, their scope and methods of work are the growth of years. A due consideration of their history, therefore, and their adaptation to new demands and uses, is necessary to a fair discussion of their future value.

The local society was the beginning and was common in most of the original States. More often it was devoted to horticulture, under the patronage of men of leisure and prominent in the State, than to general farm work. The most successful of these organizations gradually attracted and combined the efforts of towns adjoining with similar resources and common interests, like the county societies of to-day. The first State to recognize and respond to this move-

ment was New York, which formed in 1791 a State society, Robert R. Livingston being its first president. Its reports contain many valuable papers from eminent men of that day. Its work was practical as shown by an extract from the records of one of its meetings in 1794, that Col. John Smith produced the model of a plowshare, according to which it was projected to make that utensil of cast iron in order to save expense in husbandry and make them cheaper than those forged from wrought iron. Col. Smith subsequently reported the highly successful use of these shares in plowing his land the following spring. In 1820 the State society was dissolved by "an act to improve the condition of agriculture" and a system inaugurated which, with some changes, continues to this day, and has served as a model for many other States. This is briefly the annual appropriation of money to be distributed in a fixed ratio to such county societies as shall raise a like amount and the requirement of full annual reports to a State board of agriculture, which in turn reports to the legislature. New Hampshire soon followed New York. The president and one delegate from each county society constituted a board of agriculture. Its source and authority were from the societies and on their gradual decline the board became useless and continued so for nearly a quarter of the century. In the meantime our Western States were opened to settlers, and the experience of the pioneers in organized agriculture bore fruit to the pioneers of those new lands, which has ripened into their thorough and munificent system of to day. The tide of improvement swept South then East again, and before the opening of the civil war, a general movement of this character was evident in all the States. In new States they were the most active agents in determining the characteristics of the soil and climate, and were given authority and means in proportion to the importance of their work. The selection and distri bution of seed and the proof of its fitness for different localities first engaged their attention, and every nation has been called to contribute of its kind, and the whole country has shared in the benefits of their investigation. The introduction of thoroughbred horses, cattle and other domestic animals was obligatory, and now is shown the wisdom of their management. Those States control the supply of grain, horses, beef, pork, wool, etc., and it is largely due to the thorough organization and intelligent methods of its original societies.

Another important part of the work for which these societies were formed, and in which ours agree, was the encouragement of the mechanic arts, and the industrial interests of their sections. The rich ores of the new country were displayed at their exhibitions and rude machinery for their reduction. Statistics of the various mining operations were collected and compared with those of other sections of the country, as to their extent and profit. Especially in sections where those interests were important, they prepared papers and discussions calling attention to the kinds of ore in the vicinity, their value and methods of readily testing them. These, briefly, were some of the demands on the earlier societies, and how well they were answered the condition of their several States still shows.

The first county societies in our State were strong and progressive, and with one exception continue so to the present time. A common error into which most of the States had fallen, of forming a State society which controlled the others was avoided. A board of agriculture was formed for certain purposes well known, and given a general supervision of the societies. More and definite authority seems not to have been given, because the societies already occupied the field and were supposed to be able to manage their own affairs. Thus while the board has gone on improving in the lines of its original inception, and has been foremost in developing new ideas, the societies occupy the same field as at first; and new organizations, notably the grange, do much of the work which they under proper authority and care might have carried on. I may be treading on dangerous and debatable ground, but a fair and intelligent discussion of State beneficiaries is open to all and must result in general good. There is a sad lack of co-operation among agricultural societies which can only be supplied by uniting them under one common control whose duty should be to determine by observation and statistical returns of secretaries and others the needs of different societies, and whose authority should be sufficient to enforce any policy deemed best under all the circumstances.

The board of agriculture has held an undefined control, which has been to that extent unsatisfactory to all. It is just, considering past relations, that their authority should be enlarged. It is natural from its representative character that it should deal with all parts of the State intelligently and fairly.

The institute work of the board is carried on under a comprehensive plan including many questions, some requiring a series of years

for their complete solution. The societies could supplement this work if under the same authority and ensure to it a wider and more intelligent reception.

The State fair exceeds in character and variety any in New England. The recent additions to its grounds and other improvements show the enterprise of its management and a determination to keep pace with its increasing popularity. Its permanent location involved considerable expense and was largely borne by the public-spirited officers. The responsibility of its success falls more heavily on them and in that proportion they should have a voice in its control. Had the State taken the place in its government to which its interest entitled it, the debt might have been avoided or so distributed as to less embarrass a change in its present management. The Eastern State fair illustrates well the adage, there is nothing so successful as success. The enthusiasm incident to new fairs has been skilfully kept up. The generous policy of inviting our neighbors to share in its advantages has met with hearty responses, and the drooping spirits of the New England fair revived by contact with its fresh and vigorous host. The crop exhibits have not been in keeping with the other departments, because general farm products have not arrived at maturity at that time. It is unfortunate for this fair that the first of September comes so early in the season. It is well for its friends to be prepared for evidences of a common idea that agricultural fairs cannot long continue such in large towns or cities. Let not the present source of its strength become an element of weakness.

The condition of our county exhibitions next claims our consideration. Some are carried out to the full extent of their purpose and their possibilities with much of the boom and enthusiasm of the West. Some are mere holiday crowds of people with nothing to look at but each other; some are combinations of fancy breeders for the exclusion of others; some are given over to horsemen, popularly called the enemies of agriculture, and some are eaten up by their friends.

A revival is needed. Now, when the condition of society becomes unhealthy, and the bulwarks of the church are imperiled by indifference and sin, the pastors commence to belabor the members, admonishing them singly and collectively to examine their conduct and relations to the church, and warning them that personal work and sacrifice alone will purify their house for the reception of a blessing and make them the instruments of its ultimate power and prosperity.

So, too, must the members of the societies cast self behind them, bring new life and vigor to the work, aroused and enlightened minds to our councils, and success to our common cause.

The State has given to us certain talents with wise provision for their care and maintenance and to her we are accountable for our stewardship.

This aid is not given to support, but to encourage efforts to improve the condition of agriculture. It is but a nucleus around which must be gathered means enough to induce a thorough preparation, to inspire a generous competition, and ensure that no honest effort shall go unrecognized or unrewarded.

The influence and incentive of our societies should be constant and not as too often the case confined to the several days of their exhibitions. A little added every day brings the steer or colt toward the limit of perfection—a little training every day brings him nearer to the highest demands of business or of pleasure. A little labor every day soon completes the preparation of the soil for seed, piles up the compost or secures the fertilizer, cares for and harvests the abundant crop. The whole year contains none too much time to prepare for a successful exhibition. Already the managers of the political parties that dispute the control of our country have located their first battle grounds and have sent out their skirmishers to discover the weak points in the opposing lines, and the holes through which they may throw mud at opposing leaders. Every hour will be improved, every honest means of raising money be employed to gain the triumph of their cause next September. The farmers' campaign also has begun and I predict for it an added interest for being in the presidential year. The enthusiasm and public spirit of the people is wrought to the highest pitch until they cannot stay at home and a good attendance is already insured. The premium lists should be prepared now, printed in small and attractive pamphlets, the expense of which will be paid by advertisers, and circulated carefully among exhibitors. It is better to mail them singly to individuals who will appreciate them than trust to any gratuitous circulation from offices and stores. Enough copies should be retained to supply constant calls and ensure an abundance of them at the exhibition for ready reference. Officers should always be on the lookout for legitimate attractions and put out small posters at once, often if need be, and even to the very day of the fair. Make them as definite and correct as possible for people soon learn to suspect the profuse, indefinite

and inflammatory style of advertising and rely on the plain business-like statement in black and white.

The day having arrived, the most important thing about a fair ground is the fence, and no person or team should pass through the gates without paying. Ample room within should be provided for hitching and the care of teams, and picnic groves will add some of the zest of camp-meeting to the festival. No bankrupt is half so forsaken as a society obliged to pay a percentage. How important therefore to conduct its business fairly and with an eye to profit, each one paying alike and all contributing to the premiums they expect to share. The attendants in each department should be recognized authorities, men well known, who are placed there to impart information and promote a mutual interest in the exhibit. Many opportunities for real benefit are lost by the inattention of cheap employes. In fact the whole machinery of a fair should be run by its friends, to whom success is of consequence and wages no object. Every class should have equal attention, as each one is jealous of its rights, and this is the time to provide against extra trustee meetings and newspaper wranglings. The trotting interest has been predominant and slightly arrogant, but the popular mind has been brought up to an appreciation and love of real merit and calls for a complete agricultural exhibition. The trotting interest is developing however from the right direction, namely, the stalls of brood mares and colts, and the performances on the track are most important as proofs of success in different lines of breeding, and excite an interest among partisans, not measured by the time made or purses competed for. The colt races at Fairfield this year have given a new impetus to the care and training of the younger ones, and the general plan of their management can be incorporated into county fairs without much outlay or risk. Societies should enter the national association and conduct races by its rules, which are wisely framed for mutual protection and the promotion of fair trials of speed. Many judges last fall would willingly have paid the fee for a few minutes' authority over combining jockies and drivers of promising young horses. A general knowledge of track rules and usages will explain many mysterious awards, prevent harsh judgments and give to this important department its proper place in popular estimation.

Adjoining fairs should form circuits so that the aggregate of purses will pay the best of horses to follow them and the purses of each

fair be reduced. The increased number of entries will lessen the amount paid, and after the circuit is well known larger premiums can be offered with little increase in actual outlay.

These annual exhibitions occurring through nearly two months of the year, when all kinds of stock are in the finest condition and all products of the soil fresh from the harvest should be improved for the sale of much of it. In Great Britain frequent market days bring together producers and buyers or consumers and the sales include every production of the farm and kindred industries. Other nations of the old world have had these customs from time immemorial and their colonies have preserved them. Prince Edward's Island to which New England pays so much for horses continues these sales with other old world notions not so commendable, and very few horses are kept long for want of a customer.

Nova Scotia, New Brunswick and especially the Canadian communities of French origin, depend largely on this system in disposing of their varied products.

Many lessons in practical farming can be learned of these people, who, bringing love of the soil, economy and thrift from fatherland, still continue them—the very virtues our agricutural writers are striving to inspire. Any project to help the sale of what is ready for the market, and save the expense of feeding and storing, should be carefully considered. The agricultural societies have room and accommodations for keeping stock; they are on or near railroads in most cases, and are purposely located to convene the farmers of the several counties. They could easily supplement the system of stock-yards now proposed and carry the principles of protection, co-operation and fair prices to every section of our State. The Texas pony swindlers were quick to avail themselves of their advantages to our sorrow.

But to return to the fair. Order is as essential to its success as to a proper enjoyment of the exercises of the meeting. Every department may be full, and attractions on every side, but if a noisy, profane crew push rudely through the crowd, the exhibition soon loses its charm and faces are turned homeward. The impressions received are carried for a year and never improve with keeping. Good police regulations are necessary and should extend to the limit allowed by statute. But to insure order I should prohibit the sale of anything in bottles, and cider at any age, quantity or previous condition. Advertise that the State law in regard to games of

chance will be enforced, and you will not be troubled with them. Encourage other games and shows, limiting them, however, as to noise, as they are a source of amusement and of revenue. Give to the ladies the better half of the exhibition building and place it in their care. Require them to revise the premium list in their department and it will be kept up with the times.

Life members are paralyzing the finances of some of our societies with privileges given and abused, and at their best are uncertain factors in officers' estimates and reports. It is better to place the fee for membership low, so low that all will join, and claim only the privilege of voting in annual meetings and a share in the honor and responsibility of its management. Finally, make it well understood that the fair will be run for the benefit especially of exhibitors, and by the payment of all premiums offered and gratuities to everything of merit not enumerated, return to them the net receipts of the exhibition. The confidence, good will and hearty co-operation inspired by such a course is better capital than cash in the treasury and always will be the essential element of success in all such undertakings.

SWEET CORN CULTURE.

By B. Walker McKeen, Fryeburg.

Read at the Turner Institute.

Sweet corn, as a staple crop, for the farmers of Maine ranks high. It has some peculiar features that lead to its value. There is always a certainty of fair compensation for the labor and capital put into the crop. As the contract is made in advance there is no uncertainty about the price to be obtained. There is nothing of a speculative character about it. The farmer is relieved from losses caused by low prices or crowded markets; thus there is a stability about it that is decidedly in his favor. It is, at once, a money crop and a forage crop. As much money is received for an average acre of sweet corn as from an average acre of any other field crop, and, also, as much and as valuable fodder as from any acre on the farm devoted wholly to a forage crop. As stock husbandry is, and must always be, the basis of New England farming and we are all looking about for sources to increase our feeding capacity, its fodder value alone makes it one of our most valuable crops.

I understand that the crop has not been extensively grown in this vicinity, but that many of you are turning your attention to it as being a crop well fitted to be raised in connection with your dairying. In this you are correct. My experience in using the fodder in a small dairy is very satisfactory. When once you get well started in the business, I assure you, you will be highly pleased with it.

With sweet corn a good paying crop can be grown, and if you wish to make a speciality of it you can do so without fear of reducing the fertility of your farms.

In considering the growing of the crop, we will start from the beginning and consider first the choice and the preparation of the ground. Any land that will grow Indian corn will grow good sweet corn. It better be a little too sandy than a little too close. And, as much of the success of the crop depends upon getting a good start in the spring, we must make a careful study of the preparation of the ground. I have obtained the best results on land prepared in the fall. Spread on about ten cords of good stable manure, work it well into the soil with a plow or disc harrow; if you plow it, don't go too deep, but, whatever else you do, don't leave any of it on top of the ground uncovered. After having carefully put the manure entirely out of sight, prepare a good seed bed. Level and pulverize the top of the ground thoroughly. Labor spent in this direction will be well repaid. Then plant good, tested seed as early as practicable. Better take the risk of frosts in the spring than in the fall. Most of the sweet corn in our vicinity has been planted with a horse corn planter for the past two years, in rows about three feet apart, and hills the same distance, putting from five to seven kernels in each hill. Line at once, to avoid depredations from crows, although they do not pull sweet corn as badly as they do yellow.

Planting with a corn planter also prevents them somewhat from pulling, as the ground is fined and the kernels of corn placed deeper in the ground. As soon as the rows can be seen start the cultivator (if I can get my courage up to sticking point I shall try the harrow on mine next spring) and keep it going at least once each week, until the corn is in the way of the horse and cultivator. A stitch in time saves nine, is as true in killing weeds as in anything else.

If you begin in season, before the weeds get fairly started, much hand labor will be saved. One piece of six acres that came to Mr. Eastman's factory, did not receive any hoeing, the labor being all

done with the cultivator. The land was kept free from weeds and an abundant crop secured. I would like to give you my method of cultivating among my corn. Always go shallow, the more so the better if the ground is all reached. I go twice in each row, beginning on the right hand side of the piece, so that the finished row shall be left at my right. I have the horse driven a little closer to that row and run the cultivater up snug to it, among the stalks if possible, paying my whole attention to that row. Returning in the same row I still keep my whole attention on my right. In this way every inch of space is covered with the cultivator, and the finished row being always behind me there is no danger of any of the corn being left covered with clods or stones. My system with sweet corn consists in plenty of shallow cultivation, leaving the ground as level as possible. You will adopt the methods that seem to you to be best adapted to your needs, but be sure to keep your land free from weeds. Clean culture is one of the great elements of success in growing sweet corn. After having carried the crop safely through the growing season, comes the time for harvesting. This is not very laborious work, but requires skill and patience to do it well. No careless hands should ever be entrusted with this work. Every good ear should be picked and every poor ear left. I have often been surprised at the amount of good corn left by even careful pickers.

The ears should also be broken off as close as possible, thus leaving more of the husks on the fodder, saving the labor of handling and the space in the cart. As soon as possible, after the ears are picked, the fodder should be cut and taken care of. If it is intended for the silo, draw it at once; if to be cured in the field, it requires careful shocking, in order to stand through the winds and storms to which it will be exposed. When sufficiently dried, it should be at once drawn to the barn and packed closely in mows, using an equal amount in bulk of dry straw, in alternate layers, to absorb the moisture. I never fed any preserved in the silo, but I can assure you that sweet corn fodder, cured in this way, is a luxury that will be appreciated by all farm stock. It is far better than yellow corn fodder, as it is cut just when the juices are all in the stalks, and there has been no loss of their valuable properties by the ripening process.

The average number of cans grown per acre by our farmers for the years they have been engaged in the business is not far from 1,500, although as high as 2,000 and 2,500 is sometimes reached.

Mr. Eastman informs me that out of the 150 acres brought to his factory last year, as many as 75 acres produced 2,000 cans per acre. And I see no reason why every piece, planted on good, well-prepared land should not reach these figures Many people not familiar with the crop, make quite a point against it out of the fact that farmers are called upon to pick the ears at any time the packers may order. But in practice this is no objection. If we raise crops of any kind we expect to put the necessary labor into their production to make them profitable, and it matters not whether we are harvesting sweet corn, agreeably to the order of our packer, or whether we are harvesting yellow corn or potatoes. Either must be performed seasonably and in a workmanlike manner. My experience leads me to believe that the farmer is seldom hurried beyond his capacity for labor. Agents will generally consult the convenience of their planters and place their orders accordingly. The packer's business, success and profits depend, in a great measure, upon the good will of the farming community in which he is located. Their interests in the production of a good article are identical, and an honest spirit of co-operation should be cultivated. No packer wishes his corn brought to his factory before it is in the proper condition for canning, and no farmer who seeks his own best interests, will wish to hold it after it passes beyond that condition, as by so doing he injures the quality of the product, lessens the demand for the article and helps to kill the goose that lays the golden egg.

The labor of harvesting sweet corn, compared with yellow or potatoes, is decidedly in favor of sweet corn. The team is driven to the field and ordinarily the ears are picked from the stalks and carried at once to the wagon; then they are drawn to the yard of the packer and all the labor and responsibility of the planter ceases. The fodder can be cut far more rapidly and with greater ease than whole corn, and after being shocked and cured it is drawn to the barn and pitched from the wagon onto the mow. The labor of standing the corn about the floor, the husking, curing and shelling and pitching the fodder from the floor onto the mow are done away with. And this is a great saving of labor, simply pitching the fodder on carts in the field and placing it at once upon the mow or in the silo.

Another item comes in here. It is the value of the waste from the factory. If any one will provide himself with a suitable place to store it, he will find this waste which may be drawn back when returning from delivering a load of corn, quite an addition to his

supply of fodder. The husks, if procured fresh and free from dirt, are eagerly eaten by all animals, and small quantities of the cobs, also, will be consumed.

If you have a silo I do not doubt but that you will find this waste of much value to preserve in it. They should be drawn in about the proportion they grew. All cobs or all husks do not make as good fodder as they do together. If you have no silo and do not want the waste to feed, it still has a value for you that will amply pay for the handling. It can be made into manure in many ways. If placed in large piles, cobs and husks together, in a short time you will have a valuable addition to your manure heap. Another plan sometimes adopted by our farmers, is to spread it upon some piece of land they intend to plow, and, perhaps, let the stock run over it, then plow it under. I have seen the good results of this practice on our own farm. But I think the best way to make manure of it, is to fill the hog pens, the yards, the barn cellars with it, and then mix it with the droppings of the animals. We made a number of loads the past fall and I wish those of you who never saw any of it might examine it and convince yourselves of its value. An idea comes in right here that should be considered by all who plant this crop. It is the small number of pounds taken from the soil, that is, if the waste is all returned. Seventy-five baskets of the unhusked ears make a good load for one pair of horses, and will weigh about 3,000 pounds, perhaps more, if the buts are broken short and there are but few husks on the ears. These seventy-five baskets will usually husk about 37 baskets of ears for the cutting machines. If the corn is good these will cut from 27 to 30 pounds to the basket, making about 1,000 pounds for the load.

The 2000 pounds of waste in the cobs and husks, the farmer is at liberty to take home with him. Three such loads will clear an acre of 1845 cans, and will make the actual amount taken from that acre 3000 pounds. All the fodder and all the waste may be returned to the soil, after having filled their mission of sustaining animal life. These facts alone make it one of the most valuable crops any one can raise, who is trying to maintain the fertility of his farm. Just here I would like to mention a practice of seeding down often followed by our sweet corn growers. Such culture is generally preferred and practiced,—leaving the land as level and smooth for the mower as it is after any grain crop. Immediately after cultivating the last time, they sow their grass seed,

with no reference to the corn. The ground is in excellent condition to receive the seed, the growing corn shades it, thus protecting it from the heat, without interfering with the growth of the roots of the tender grass, and the result is generally a fine stand of grass and a full crop the next season. They claim the catch is not injured as much in harvesting the corn as it is with any grain crop. The corn stands through the heat of summer affording its welcome shade much longer than the grain. The amount of labor thus saved is considerable, and those who have tried the method claim the results to be as good. So you all see that you are raising a money crop, that pays well, and at the same time producing as much fodder for home consumption as though no crop had been sold from the land, and leaving the ground in the best possible condition for the grass crop to follow, taking but a small amount of fertility from the soil, without extra labor and with no fear of competition, when you grow sweet corn.

As to choice of fertilizers, my experience and observation lead me to the conclusion that barn manure, from five to ten cords to the acre, must be the main reliance, perhaps with a small portion of some reliable phosphate in the hill, to start the crop. Still, as good results can be obtained, I think, if we use a fair amount of barn manure, by using extra care in preparing the seed bed, properly fining the soil and putting it in just the right condition to receive the seed. A little extra labor in this direction will generally do more to start the crop than twice the value put into phosphates. When the industry was first introduced into our section, it was the practice of many, to plow old pasture-land, put on a little phosphate, and plant to sweet corn. This practice led to good results for a while. I have seen fourteen hundred cans harvested from such land, with no manure. But finally the reward came and all such land refused to yield an increase; it had been starved. The seed became run out and the final summing up was not so satisfactory.

Now we come to what I think is one of the most essential points in the culture of sweet corn It is the choice and care of the seed. It is very much to be desired, if not an absolute necessity, that a good stand be secured Every hill should produce its quota of ears. If there are many missing hills, the ground will be cultivated at a loss. And in order to secure a good stand it is necessary that we obtain good seed, seed that will grow. And no man can tell by the looks of it at planting time, whether one-tenth or nine-tenths will

grow. Frequently the poorest seed to look at comes the best. I believe there is no witchcraft about saving sweet corn seed, but a great amount of care and labor is necessary if we would produce the best. My experience in this matter is different from that of some of my neighbors. I have always had better success with seed grown near home. Others will tell you differently. I think the reason that seed from away has done better than home grown is because it was cured better. No one should undertake to save the seed unless he has a suitable place, and the time and inclination to look after it carefully. One man in Fryeburg has saved a quantity each year, for some time, and sells it to his neighbors. His practice is to leave a certain portion of his piece, and, just before a heavy frost, pick the ears, husk them, leaving just enough husk to tie, on each ear, then tie them two together, and throw them over poles near his kitchen stove, the object being to dry it as quickly as possible. It is no matter if the kernel is considerably shrivelled, it will grow. The seed is sometimes saved without husking. If well ripened on the stalk, carefully broken off and laid on a slat floor in a room always above freezing and free from dampness, it may be cured nicely, but I would advise drying it over poles. Always avoid freezing the seed. A neighbor who has saved good seed for several years, lost the whole of his last year from the effects of freezing before the moisture was all out of it, not one kernel in one hundred having vitality enough to sprout, even under the most favorable circumstances. Those who have tried it, report but little difference between the value of the green corn at three cents per can of twenty-six ounces and the seed at three dollars per bushel.

So, if you grow the crop in large quantities, you will wish to save your own seed and can do so to the best advantage by selecting some careful man from among you who has the facilities and the disposition to take good care of the seed. Let him save it for all of you; much labor will be saved in the aggregate, and you will secure home grown seed of uniform quality, thus ensuring to yourselves and your packer a certainty that your labors are not to go for nothing, because the seed fails to come up. Let me caution you against using any seed, no matter where it was grown, that has laid over one year after being shelled. It requires as good care to protect it from moths as it does your most costly furs. Mr. Eastman purchased a small quantity of early Allen seed last year, which he

thought was first class. He advised those who planted it to seed lightly as every kernel would be sure to grow. I planted one acre of it for a neighbor without noticing any fault in the seed. But the next day, in another man's field, the sun happened to shine into the seed box of my planter as I was filling it and I noticed some poor kernels.

Examination revealed the fact that quite a large portion of the kernels were destitute of chits. The moth had done his work so well that these were wholly worthless for seed and had left them so that it required a practised eye to discover the fraud.

The market demands a small kernel. A twelve rowed variety, comes the nearest to filling the bill. It should be kept as pure as possible, both on account of the uniformity in ripening, and, because, when it goes to the cutting machines, much less will be wasted if the ears are about of a size. Much can be done to improve the seed by selecting the longest, slimest ears. A long, small ear is the one that gets cut the cleanest, and it has less cob than the large, short one. It is only by raising good crops of any kind that we can expect any profits. This is especially true of sweet corn. If the yellow corn does not fully ripen we save the smaller ears to feed, and, by careful selection, can get all the value there is in it. If the potatoes are small we use them, and their value as food for stock is not lessened by their small size. If the grain is light we are sure of what there is. If the hay crop is cut short, it often is of superior quality, and we carefully harvest what we have and realize its full value, but poor sweet corn yields nothing but disappointment and dissatisfaction. The planter has his hopes raised by the seeming fullness of the ears, before they are husked, and is disappointed with the returns. The packer sees his crew working at a disadvantage, to put up an inferior article, and grumbles. The huskers and cutters are out of patience, and unless carefully watched, will chuck every ear that bothers them into the waste, and as the crop passes beyond the control of the farmer after unloading at the factory, his losses on the poor corn are sure to be more than in just proportion to those on the good; so I advise you who are just starting in the business to plant only what you can well prepare, well manure and well tend. Get a good early start, with every hill standing, keep your land free from weeds, and when your corn goes to the factory, the packers will be glad to see it; the help will all be on good terms with you, and when cutting your corn will try their level best to get every ear

from the husks and every kernel from the cobs, and when the returns are reported to you, you will be disappointed in the right direction and will return home pleased and satisfied, with the balance on the right side of your ledger. I have known it to vary from 17 to 32 pounds to the basket, and from $15 to $75 to the acre. This may seem a wide range but is nevertheless true, and probably, in nine cases out of every ten the failure to produce a good crop was due to some blunder or neglect of the planter. These facts should encourage us all to renewed efforts to produce first-class crops. Having considered the preparation of the ground, the case of the growing crop and the labor of harvesting, we will now compare the profits to be derived from it with those of some other crops usually sold from our farms. In the report of the Statistitian of the Department of Agriculture for 1885, we find the following:

"The uses of the potato are unchanged. There is no export demand, and the requirements of consumption are only affected by increase in population. The highest price in ten years was 90.9 cents in 1881. In this crop the price is controlled wholly by the home supply. The lowest price was in the year of the largest yield in 1875. The average value per bushel is 51.9 cents against 56.2 cents for the preceding ten years. The yield per acre has averaged 80.1 bushels against 87.7 for the former period. The value per acre is $41 55 against $49.31 for the former period. The large element of labor in this crop, makes the cost of production high, the profits coming with a heavy yield.

In Maine the average yield for the same period is 97 bushels and the price 46 cents, making the value of an acre $44.62. And in the report for Indian corn the average number of bushels per acre, for Maine, is 34.7 and the price per bushel 75 cents, making the value of an acre $26.02. This report, with a comparison of values, will give you some idea of the value of sweet corn as a money crop, always remembering the fact that the labor is in favor of the sweet corn. There is not much difference between the average crop of sweet corn and potatoes, but, with the latter, there is no fodder left, with an element of labor that is almost insurmountable. Any farmer who grows potatoes largely, must, necessarily, have quite a portion of his farm in a crop that produces no fodder every year, and have an abundant supply of labor at his command. The low money value of yellow corn places it entirely out of comparison as a pay-

ing crop for us to raise, to sell. With sweet corn as a basis we may have rotation of crops for the farm that are exhaustive, that produce fodder every year, and that will enable us to maintain the fertility of our farms without looking beyond them for fertilizers. When we sell an average acre of potatoes 5,820 pounds are drawn from the farm, with nothing left to replace the lost fertility; when an acre of yellow corn goes we lose but 1,943 pounds, but get only $26.02 for our labor, risk and use of the land. When an average acre of sweet corn is sold we lose but 2,437 pounds and, at present prices, get $45.00 for our crop, and have left at our disposal, as before stated, as much value in fodder as on any other portion of our land. In fact, sweet corn combines within itself all the elements of a first class special crop to you for money and those of a general purpose crop; one which all of us can raise and feel that we are reaping an abundant harvest for our labor in ready cash, and also supplying ourselves with necessary fodder. Thus we can all become specialists and console ourselves with the fact that we are raising a crop unequalled for general purposes.

THE BUSINESS SIDE OF FARMING AND THE VALUE OF ORGANIZATION.

By GEO. AUSTIN BOWEN, M. D., Woodstock, Conn.

[Prepared expressly for the Massachusetts Board of Agriculture and presented at their winter meeting at Springfield.]

Read at the Institute at North Yarmouth.

The primitive agriculture of New England, rude and unscientific as it was, filled well its mission, and was fully on a level with the other great industries of the world, and in accord with the advanced thought of those times. The old world, or that section which we so denominate, was trammeled with the traditions and bigotry of the past, which by their very nature utterly checked all civilizing influences, or greatly retarded their growth. The settlement of New England was the outgrowth of the most progressive idea of the century, and brought to these shores progressive men and women who little dreamed that they were founding a mighty nation, the equal whereof history had no knowledge, and whose ultimate conditions are now in our hands for developing.

All national prosperity depends upon agriculture. This is a truism that none can deny; history has proved it times without number. Nations which have encouraged it have progressed in civilization, while those that have given it but little thought or attention, have either lost position or existence. Our considerations to-day, infinitesimal as they will be in our future agricultural history, will still have a bearing upon that magnificent future.

To fully understand the business side of farming, we must have a full knowledge of the basis of agriculture; that is the amount of land available, and its capacity for production; and that other equally important question, the consumption of the output. Pardon me then for giving you a few statistics, dry morsels to masticate I know, but, call all your national pride to your help, it may aid in their digestion and thereby strengthen your belief in that comprehensive word *business*.

A little party of men who went out to explore the country around the Massachusetts Bay Colony, penetrated the wilderness some fifteen miles west of the present town of Lynn, but returned and settled that town, believing that beyond it the country was worthless. And the good old fathers of that day, decided that there could never be a large population west of Boston's suburb, Newton. What have we to-day? An area of 2,970,000 square miles according to the census of 1880, with about 1,500,000 square miles of arable territory, not including Alaska; and a population of 50,000,000. A seaboard of 12,000 miles, giving us intercourse with foreign nations. The river-flow east of the Rocky Mountains is about 40,000 miles exclusive of all rivers under 100 miles in length, offering 80,000 miles of river bank to commerce, against the 17,000 of Europe. The Mississippi and its affluents alone giving 35,000 miles. The Mississippi and Missouri rivers offer 3,900 miles of navigable waters. Add to these the Great Lakes which are said to contain one half of the fresh water of the Globe, and the system of canals which connect them with rivers, and we have an immense power aiding us in the development of our enormous acreage.

This subject of area, can we comprehend it? A difficult task but let us endeavor to. At the first glance we see a vast country stretching from the north where the snow never melts, to the far south where it never falls, its area including Alaska almost equaling the whole of Europe, with its 22 different nationalities. It is eighteen times larger than Spain, forty-one times larger than Great

Britain and Ireland. Great Britain, France, Germany, Austria, Italy, Spain, Portugal, Switzerland, Scandinavia and Greece, could be placed within our limits, once, twice, thrice. This is simply the size of Uncle Sam's farm.

To give some idea of the capabilities of this vast farm, I quote Dr. Josiah Strong's figures as found in his volume "Our Country." "The crops of 1879 after feeding our 50,000,000 of inhabitants furnished more than 283,000,000 bushels of grain for export. The corn, wheat, oats, barley, rye, buckwheat and potatoes—that is the food crops, were that year produced on 105,097,750 acres or 164,215 square miles."

But this is less than one-ninth of the smallest estimate of our arable lands. If therefore it were all brought under the plow, it would feed 450,000,000 and afford 2,554,000,000 bushels of grain for export. But this is not all. So excellent an authority as Mr. Edward Atkinson, says, that where we now support 50,000,000 people, "One hundred millions could be sustained without increasing the area of a single farm, or adding one to their number, by merely bringing our product up to our *average standard of reasonably good agriculture;* and then there might remain for export twice the quantity we now send abroad to feed the hungry in foreign lands." If this be true (and it will hardly be questioned by any one widely acquainted with our wasteful American farming), 1,500,000 square miles of cultivated land—less than one-half of our entire area this side of Alaska—are capable of feeding a population of 900,000,000, and of producing an excess of 5,100,000,000 bushels of grain for exportation; or, if the crops were all consumed at home, it would feed a population one-eighth larger; viz, 1,012,000,000. This corresponds very nearly with results obtained by an entirely different process from data afforded by the best scientific authority*. It need not therefore, make a very severe draft on our credulity to say that our agricultural resources if fully developed would sustain a thousand million souls."

Why all these statistics at the beginning of this paper? Simply that we may have a comprehensive idea of our "stock in trade," for it is easier for us to develop the business side of agriculture by way of the nation, than by the way of localities. The subject given me is a broad one. It is not how the New England farmer can realize a higher price for his butter and eggs; for his veal in the spring, and

*See Enclyopedia Britannica, Vol. 1, p. 717,

his apples in the fall. It relates to the American farmer whatever section he may dwell in; why should he, and how can he enhance his whole condition by the application of business rules. A system must be developed whereby the cranberry grower of Cape Cod, the fruit and wheat raisers of California, the small farmer of the North, and the extensive planter of the South may be alike benefited. Having seen our land, our farm as it were, and studied its capability, let us glance at our farmer. In New England he is a descendant of the English Puritans, with a few from Scotch and Welch. The Dutch peopled New York. Pennsylvania was settled by Quakers and Germans. Maryland by English Roman Catholics. Delaware by Dutch and Swedes. Virginia by English cavaliers. The Carolinas in part by French Huguenots. Louisana by French. Florida, Texas and California by Spanish. Utah by Mormons, chiefly from England, Wales and Denmark. Immigration from Ireland, Germany, England and Scotland, France, Switzerland and Sweden has been large and progressive and now Italy is sending heavy consignments. To this conglomeration of humanity, we may add a large percentage of Africans throughout the South and a few Chinese in the West. By reason of the social and political situations in Europe, this immigration will continue with increasing proportions for at least the next few decades. This then is our land, and from these nationalities come our seven millions of farmers. Men inheriting different traditions, modes and methods of farming and marketing; bringing with them from the old country many national dislikes and prejudices; many of them ignorant of the ways of business as it is carried on in commercial circles, and all living comparatively isolated lives. These are the discordant elements that must be united. The kindred tie of agriculture will not do it, any more than the tie of mercantile life will unite the trader and dealer. Business, or the organized effort to secure the almighty dollar, blends them into one body; unites and harmonizes the varied interests, and whatsoever the nationality or calling, it alike receives and gives support.

Possibly the American farmer has heretofore had but little need of business aids. The country merchant took the few articles raised for market, and gave him in return articles which his farm or household could not supply. His wants were few, and home industries mostly supplied them. But times have greatly changed, and are to change yet more. Wants multiply; what were once luxuries of life are now necessities. The spirit of the times is progressive. Rapid

changes are being made in all our domestic surroundings. Steam, electricity and printing, have wrought a social revolution; leveling all class distinctions, giving equal opportunities to all who are keen enough to grasp them. Town and country are becoming more intimately blended. The ordinary farm-home of to-day is more luxurious than the dwelling of the man of wealth of a few decades ago. The farmer is no longer known by his dress. His sons and daughters acquire the same accomplishments as do those of business and professional men. The great peculiarlity of these changes is that they have all come so suddenly; with them has come a great change in the methods of business, fully as great as steam has wrought in the system of transportation; or electricity in the art of converging intelligence. The time when the country trader was the recognized exponent of all business requirements is within the memory of us all. To-day he represents the lowest place. All the great and confusing whirl of business excitement that we witness abroad has been developed and is controlled by the expression of one word, *co-operation;* it is the life of business; the vitality of the nation depends upon it. It is revolutionizing the world; modes and systems heretofore considered as all sufficient have been overturned by it. Traders, manufacturing interests, transportation companies, banking and commercial circles, land improvement companies, fire and life insurance companies, and the hosts of interests that constitute the business of the country have been quick to see its advantages, and to secure them by adopting it. All but agriculture. Individuality, both of purpose and resources still characterize it. Co-operation is now the progressive idea of the times. Farmers of Massachusetts, descendants of the Pilgrim Fathers, who were the leading representatives of the progressive idea of their day, are you ready to accept of it and prove the purity of your lineage; or have you lost the keenness and acumen that characterized them and feel content to take a low position in the social scale reserved for the unsuccessful business man? The successful man is always the one who is in the channels of business, and thereby gets his share of it. The one who is without these channels, receives but a stray portion now and then, insufficient for his maintenance.

Should I ask any intelligent farmer in this audience, or in New England for that matter, to state the greatest drawback to eastern agriculture, his reply would be *the want of capital.* Granted that I am right in this, let me ask how do you, an ambitious man, and

desiring to succeed in the world, and give a respectable maintenance to your family, expect to acquire it? To my mind there are only two ways: waiting for an aged father or aunt to die and leave it to you, or to get it through the business of the farm. Unfortunately for us of the present generation, aged and wealthy parents are not numerous enough to make a class of, and the aunties who own dividend paying stocks and bonds all have more deserving nephews elsewhere, leaving us to look to our farms as our only hope. The questions then that are pertinent, are: Is the business of our farms bringing us in capital to-day? Are we receiving gold, silver, or Uncle Sam's promissory notes for our crops? Or are we trading them away at ruinously low rates for "jack boots" and overalls, treacle, kerosene oil, and codfish, baking soda, the prominent soap, cayenne pepper and ginger? Useful articles in their places, but like the Chinaman's "too muchee samee alle timee, but no buy circus ticket." As you are at present situated, will your farm enable you to become a progressive member of this progressive generation, and thus contribute your share for keeping up New England's reputation for mental superiority? I will answer the question for you and save you the humiliating acknowledgment. No. It is now your turn to question, and your interrogation will be: Is there a way out? Is there brightness ahead? Can the gloom that comes from financial depression be dispelled? Can the New England farmer maintain himself and his family, keeping abreast with the times, developing his material resources, and leave the farm the better for his occupancy? Unhesitatingly I answer yes; but not by the old system of farm business, but by co-operation: In other words by following the modern system of business. I believe in New England agriculture, and beyond that I believe in the people her soil has developed; in their perception, keenness and good judgment, which prompts me to say that I have faith in their future actions.

Can I offer you any help by indicating how the individual farmer can enhance his prosperity by co-operation with his neighbor? Possibly. I will endeavor to. Not however by any device or scheme of my own, new and untried. I have not the vanity or egotism to sustain me in that, but by relating to you the action that is going on in other sections, the same as the traveller in foreign lands will describe to you the scenes he has witnessed, or perhaps participated in, for here and there, co-operation has reached the farm at last, and we are not wanting in many successful examples.

Before the general farmer begins to co-operate with his neighbor, he has a few things to learn. The old divines used to recommend an occasional self-examination, as being of great good to the individual, taken from a theological standpoint. If we shift the point of observation from the theological one, with its futurity of the soul, to the material one of present business (which is not a violent action, as a person's religion depends much upon his financial relations) we shall find an examination to be equally beneficial. All farmers cannot co-operate, "they are not built that way," but the man that cannot must drop out of existence, there is no place for him. The world does not want him; farewell, *requiescat in pace*. But the farmer who has mingled enough with his townspeople to know that there are others in the world who know at least as much as he does, has a sufficient foundation for his business salvation. There are as good men in your town as you are; possibly better, brighter, keener and better educated, and withal fully as honest. Therefore learn to put away *mistrust*, which should belong only to the savage in whose mind it is always a leading characteristic, and receive and nurture in its place *confidence*, which is the woof which holds together the web of business He must learn the value of integrity of character, that those who are engaged in business with him, may have a confidence in return. And this little point also, that none but honest goods should receive honest prices. He must learn that breeding has at last told on the human race and that brain power is now more potent than brawn and has taken the lead of it, for the successful farmers of every section as well as those of other callings are the brain workers. Having learned these fundamental facts, cultivate energy and activity, and learn to value time. These are the grand essentials, which if closely followed up will give a positiveness to a man's character which brings him to success by its own inherent force.

Two neighbors having learned these points can easily co-operate. The old-fashioned system of "changing work" was a good one, and can to-day be carried to other things. Expensive farm machinery can be owned in common. Stock for breeding purposes on neighboring farms need not be duplicated, but made a subject of joint ownership; thereby securing a far better animal, and lessening the expense, both of purchase and of keeping. A one hundred dollar bull will do far more towards improving the stock of a neighborhood than two fifty-dollar ones will, not to speak of the time spent in the

care of an extra beast, which is considerable in the course of a year. This is practical co-operation, and here and there we find it carried out successfully. Go a step higher, form partnership. Some of the most successful farmers of my acquaintance have made their money in this way. Extend this system farther, let it embrace the dairies of all the farmers of a section; for if two can work together to an advantage, greater numbers can secure greater advantages. Carry your thoughts back to your own neighborhoods. How many churns have splashed and dashed the cream to-day? How many children have been kept at home from school to supply the motive power for them, learning to hate the farm, and at the same time are losing their education? How much of that butter made is a first-class article? The milk set at all temperatures, and by many methods, creamed at all lengths of time, salted, and finally marketed in all manner of ways; the latter operation requiring many hours' time of fifty men and as many horses. That butter has been produced at a great cost to each individual, and is perhaps worth on an average twenty-five cents a pound, store pay. (Oh, how it makes the boys and girls love the farm when they make a requisition on the paternal pocket-book, and find only store pay)! Glance at the co-operative dairy system. A regular method of proceeding is carried out by all in the feeding of the cows, setting the milk and creaming it. It only requires the labor of three men and a pair of horses to collect the cream, make the butter, salt, work and market it, and cleanse the utensils, greatly lessening the cost with a far better result in the butter yield, giving a uniform quality which brings from three to five cents per pound more than dairy butter, which although a strong point is backed up by a stronger one yet, in the fact that it brings cash, a medium that we are each year forced to use more and more of. It does not require the aid of figures to prove the advantages of organization here. Then why have we not a creamery organization in every agricultural town in New England? Many of them have endeavored to establish them, but failed, simply for lack of confidence; mistrust and suspicion of neighbors has been allowed to keep dollars out of the pocket. The sweet hill pastures and pure streams of New England should place her at the head of the dairy interests of the world. She will take that position yet, but not till her farmers have christianized their moral natures, as well as reformed their business habits. Her ministers can aid them more in the former by preaching good will, fellowship,

and toleration while in the life, rather than Andover's scare crow of no probation after death.

Carry this system into other branches of farm production, and money will accrue in the same manner. Neighboring farmers can raise pork, beef or special crops and unite in the marketing of them. The apple crop of New England which is now about one-third wasted, should be sold by organization, through a fruit exchange, as the cotton of the South is sold, and the peach crop of Delaware, or held in cold storage at convenient points on the railroads. Farmers raise enough on their farms to all grow rich, but how few of them do it, mainly because they act as individuals in their sales and not as organizations, as do those of other callings. Is this a showing of business management?

To look at the purchase side of the question. Every item brought to the farm is bought at the extreme retail price, fertilizers, grain, implements, dry goods and groceries all require it. Again it requires no arithmetical calculation to show that could these articles be purchased in quantity, they could be had at wholesale figures as the merchant secures his. Co-operative purchasing and distributing is largely carried on in many sections by means of organization, to the great advantage of the farmer, and is strong evidence of his business sagacity. The business of organization, if we can so term it, has been brought to a finer point yet. The wholesale dealer has not only expressed a willingness to sell to co-operative organizations at wholesale rates, but actually agrees to sell to the individual member of the association, small lots at regular wholesale rates; articles need not be ordered in quantity, the trade of the organization being concentrated to this dealer brings large sales in the aggregate.

Organization not only aids the farmer to sell and purchase to more advantage, but is able to open up new outlets for farm productions. The cranberry grower of Cape Cod could not afford to visit Europe to develop the market there, but the American Cranberry Growers' Association can well afford to send one of its members there, and open up an immense business and add a handsome percentage to the price now received. This course is often adopted by manufacturing associations, to their mutual advantage, by creating a demand for their goods in new sections.

But it is not in the purchase and sale of goods alone that the farmer sees the benefit of an organization. A far stronger point is in the help it gives him in maintaining his business in its integrity,

and not allowing the organized efforts of others to despoil him. How can this be, can the business be wrested from his hands? Perhaps not, but it can be so crowded down by customs, by unjust legislation, by the avarice and greed of those who have no smypathy with it, by the unjust extortion of those who live by handling its production (middle-men so called), as to render it unremunerative as a calling; and unremunerative agriculture is a national disaster. Our American farm-homes as we look at them are perfect pictures of peace and tranquility. They are the preserves of the ideas that have built up this republic. They have been the homes of the strong men who have guided and controlled it. They have produced the educators of the people and to them we look for the highest examples of purity, honesty and uprightness, rather than to the city dwelling. They are essentially American, the cities are more than one-half European. The future greatness of America will come from her farms, depress them, curtail the income, reduce the farmer in the social scale, as is his European brother, and it will in corresponding ratio reduce the country's greatness. But, on the other hand, enhance the condition of the farmer, give him comforts, and the means of education, and it will show in the greatness, goodness and power of the nation. Is there a need of investigating this feature of guarding the business of farming? I answer, yes. The business of farming ought to be the best paying one in the country to-day, but it is not, and if left without guidance it will be worse in the future. The individual farmer can do nothing to avert this, he may see the threatened danger, and exclaim against it, but will be powerless to act. Let us enumerate some of the threatened dangers, and then examine them a moment in detail. The dairy interest is threatened by the evil of oleomargarine, unjust extortions by railroad corporations, the injudicious clearing of forest land, the organized efforts of speculators to depress prices, changes in the tariff rates, foreign landlordism, the effects of immigration, and many like questions we find in the list, giving the idea at the start that the farmer needs to be a Statesman as well.

If there is a farmer present who thinks that it is not necessary to receive the help of his brother farmer by organization, I hope that he will give attention while we glance at the dairy problem. According to a carefully prepared statement in the New York Herald, the capital invested in the dairy business is almost five times larger than the aggregate banking capital of the country; the latter being

nearly $671,000,000, while the dairy employs above $3,000,000,000. There are estimated to be 21,000,000 milch cows with an aggregate milk production of 7,350,000,000 gallons. Of this ocean of milk 4,000,000,000 gallons are used for butter, 700,000,000 for cheese, 2,480,000,000 are consumed in a pure state. The output of butter is about 1,350,000,000 pounds annually, and of cheese 6,500,000 pounds. The annual value of our dairy products is stated to be nearly $500,000,000, or twenty millions more than the value of the wheat crop, and closely approximating that of the corn crop. To support this immense dairy herd 100,000 000 acres of pasture land, having a value of $2,500,000,000, are required. A gigantic business truly. Cheating, greed and avarice could easily creep in here at the many unguarded doors, and it silently did. Artificial or bogus butter became known, 60,000,000 pounds being placed on the market in one year, manufactured in thirty-seven factories known to the internal revenue department, with probably much more from factories unknown. The output was distributed through two hundred and sixty-six wholesale dealers. Shoddy butter can be manufactured at a cost of three cents per pound, but "a real good creamery article" costs a trifle more. Sixty different articles entering its composition are mentioned in the letters patent which protect it to seventeen patentees. Many of these articles are very questionable, to say the least, and others highly injurious. The immense dairy interest of the country, producing a healthy, nutritious and necessary article for human consumption, and maintaining thousands upon thousands of families throughout the land, was threatened with almost total extinction by a handful of unprincipled men, who through avarice, sold unjust and unwholesome goods as pure butter. The price of butter was materially lowered, the fraud was growing fast and threatened still greater injury. Individual farmers throughout the land raved and protested with about the same effect as would have been produced had their ire been directed against the keen blasts of winter. It was taken up, however, by an organized body of farmers, who were trained to think and act in harmony; who after many trials and defeats in both State and National legislatures, saw the entire trade placed under the control of the law, with the effect of restoring the price of butter and restricting its imitation. Did not that organization attend to the business side of farming? That battle has been fought and the enemy routed; but they are gathering again, and another trial of

strength will take place. Organization must be made now to meet it.

Mr. Chairman, it would take too long to tell the history of the railroads of this country. How originally constructed by the will of the people, to be the servant of the people, they gained strength and finally declared themselves to be the masters of the people, and, in many ways, robbed and burdened the very ones whose vote created them. The fraud and trickery and disgraceful acts of the majority of these corporations should lodge each director in the penitentiary. A large part of the burden fell upon the farmers; and repeatedly have I heard them cry out against it, but without avail; they acted as individuals without organization. But the same body of farmers who fought bogus butter, fought the railroads and placed over them the power of the Inter State Commerce Commission, the best act Congress has done in many years. But, here again, the battle though fought and won, still requires organization to maintain it. Individual farmer, who thinks organization unnecessary, how do you propose to do your share?

The influence of forests upon agriculture is well known. To a certain extent they must be preserved or agriculture suffers, or, perhaps, perishes. This is especially true in our hot, dry climate. Organized effort of the farmers of the whole country is needed to check the waste and destruction that is going on. Who else besides farmers are interested in this vital question? Statesmen who love their country and protect its interests because of that love? Alas, I know of none. Farmers, that question is in your keeping; you must organize and protect youselves. All you can do alone and unaided is to spare the old button ball tree in the side yard, and, perhaps, neglect your alder swamp, but that is not the question of forestry. There are large tracts of forest lands in all sections that the wanton spirit of destruction is ruining; drouth and barrenness will surely follow. It is our business to protect ourselves in this matter.

As one of the threatened dangers to agriculture against which we must guard by organization, I have mentioned speculation. Humanity has always been prone to indulge in it, but I think that the genus homo as produced on American soil, is more of an adept at it than the European variety. Abroad gambling is not looked upon with much disfavor. Here all good society discountenances it. The would-be gambler, however, turns speculator, and is honored by all classes except the farmer; he has learned that the prices of the great

staple crops are not regulated by the law of supply and demand, but by "corners," "puts," "calls," "futures," &c., and every one of these acting as a depressor to his interest. At the first glance we should say that it cannot be checked, but upon investigation we find that it has been very effectually restrained by farmers who have by organization learned of the true state of the market, have built their own elevators, stored their grain, organized their own banks from which they could obtain loans upon their crops so stored if necessary, and thus defy these deliberate acts of systematized robbery. Repeatedly have these co-operating farmers saved their crops by so doing. I am of the opinion that they understood the business side of farming.

Tariff rates, "a bone of contention," producers desiring that it shall be one way, and manufacturers insisting upon another, and neither just agreeing with the consumer. The merits of this subtle question we will not pause to discuss at present, but content ourselves with the statement that a protective tariff benefits the farmer, and in order to secure and maintain it organization and co-operation of labor are necessary. Sheep husbandry in the United States offers us a suitable example. Why is the industry declining? simply because the wool it produces does not bring a high enough price in market. Unfortunately Americans are not mutton eaters, and we cannot value the carcass of a sheep very highly; its whole merit must rest upon the wool clip. This is a national question, affecting alike the farmers of all sections and it is to our business interests to investigate it and see it righted. For sixteen years of our history, Congress imposed a fair protective tariff on wool, with the effect of increasing the wool industries more than all the preceding one hundred years. In 1883, Congress reduced the wool tariff, since which a steady decline has taken place in the wool growing industry of the country, the decrease from July 1886 to July 1887 being three and a half million head; while the wool we imported in 1886 cost $13,794,213 besides $40,536,509 worth of manufactured woolens. Farmers, this should not be. It was not disease that carried off the three and a half million of sheep last year; neither was it dogs. American dogs, like their masters, only indulge in a mutton diet on special occasions; they were killed by the tariff. Had this amount of imported wool, and that required for the imported manufactured goods been grown in this country, and manufactured by American working men and women, in turn fed by Amer-

ican farmers, the business of farming would not show the depression it does to-day. France protects her farmers by fixing the tariff so high on beef, pork and grain, as to make them prohibitory. And while our Congress was discussing the advisability of making raw sugars free, Spain increased her tariff on cereals twenty-five per cent. There are a host of other minor industries, that, were they protected, would materially help the farmer. We learn that there were over sixteen million dozen of eggs imported last year, mostly from France, free of all duty; surely a discouraging prospect for every ambitious yankee hen. The British Provinces send us large quantities of potatoes every year, and I noticed in a recent newspaper an announcement that a cargo of them had just arrived from Scotland, the small import duty being no hindrance. Whether I am right or wrong in my deductions, this is an important question for farmers to consider. Tariff tinkers are busy now, and during the coming session of Congress the free admission of "raw materials" of all kinds, all farm productions are raw materials, will be agitated by men whose sympathies are not with the producer. Here, again, the farmer can help himself only by organization.

If I am right in my position that the farmer has to-day a need to protect his business by a concert of action, I must not pass by a threatened peril to American agriculture, which farmers should be the first to perceive, to warn against, and to oppose; actuated thereto by a love for their calling, as well as a love for their country. I allude to the growing evil of foreign landlordism. It certainly is not desirable that any considerable tract of land should be owned by persons more interested in another country and form of government than our own, that owe allegiance elsewhere and will never aid in advancing the progress of our country. As Americans we should oppose them, because we love our country and desire its development. As farmers we should oppose them, because we believe in the right of every farmer to own the soil he tills. It makes him a better farmer, a better citizen, and a more patriotic one. We do not wish the tenant farming system, with all its attendant evils, introduced here, but it has been, and only last spring I read of evictions in Iowa for non-payment of rent to a foreign landlord. Of late years, the ownership of land in Great Britain has not been as profitable as formerly, which has prompted capitalists to look elsewhere for investments. The cheap lands of America were tempting baits and have drawn them hither, many of them presumably for

speculative purposes, but not in all cases, by any means, as their large tracts are being divided into farms, and let to tenant farmers, and in some instances the tenant farmers of England brought here and placed upon them. So silently has this evil grown that few are aware of its proportions, and when I tell you that *more than twenty millions of acres* of land in the United States is thus owned by aliens, you will be surprised by the statement. Among the largest of these foreign land owners are the Duke of Sutherland, Duke of Hamilton, Earl Dunroven and Marquis of Tweeddale, the last of whom owns a tract of 2,300 square miles, while his English holdings are only 67 square miles. These four men own 23,000 square miles of our territory, equal to the area of Massachusetts, Rhode Island, Connecticut, New Jersey and Delaware, nearly one-half of the original thirteen colonies. The State of Texas is largely attracting this foreign capital. Land agents and surveyors are busy locating and securing lands for them. What the future developments will be are watched for with interest. But this certainly is a question demanding concerted action by farmers to have such laws enacted as to prevent large holdings by aliens. This is not the only land question before the public to-day; there are others of equal interest and import but this is sufficient for our subject.

Following these questions we see that the farmer requires to co-operate with others, his immediate neighbors for small items of personal business, with his neighborhood or section for the sale of staple crops and large purchases, and for State legislation, and beyond that he should in some manner co-operate with the farmers of the entire nation to secure just and equitable laws whereby he may be protected. Thus the foundation for the business is secured and made permanent.

I am aware that thus far I have talked *at* the subject in a general way, and have not offered any plans by which co-operation can be carried on in the complete manner it should be. My duty on this occasion is to present practical plans to your knowledge, and I should fail in that duty were I to leave my subject here as many oftentimes do who insist upon reform but offer no plans by which to carry it out. Some twenty-one years ago, an order was devised and systematized for this very purpose of aiding the farmer to aid himself, by educating him in business and general information, by promoting his social welfare, and assisting him in the necessary purchases and sales incidental to his condition. Its projectors named it the

grange, or in other words the farm. In the first period of its history it has proved itself to be the most practical of the beneficial orders in existence. Simply stated it consists of subordinate granges which are local in their action. These by representatives form a State grange; and all State granges by representatives form the national grange. A number of subordinate granges may also unite and form a county or district grange. It is the strongest order numerically speaking in the United States. It was created for the benefit of the farmer and his family, and receives into its membership the farmer's wife and his children who have attained the age of fourteen years. It is the most practical example of organization and co-operation that I know of, therefore I introduce it here, and commend it to your consideration. In fact I could not do otherwise and develop the subject, for it is the only means thus far devised by which farmers unknown to each other can co-operate in the three ways named: locally, by sections and nationally, and co-operation in agriculture to be perfect must embrace them all. It is a grand order; comprehensive in its conception, lofty in its aims, noble in its perception, and wonderfully successful in its achievements. Wherever it locates it brings the aid of organization to its members, and offers them its own distinctive business helps. It possesses its own banks, fruit exchanges, fire and life insurance companies, grain elevators and warehouses, co-operative stores, purchasing agents and sytematized trading arrangements, and thus exemplifies the idea of a farmer minding his own business by giving him the facilities for so doing.

The incumbent of the chair of agriculture of the *Storrs' Agricultural School* of Connecticut, Prof. Chamberlain, writes me under a recent date, and speaks of the grange as having but "one purpose of lifting agriculturalists and through them agriculture, out of their and its degradation, and up to a level with other industries, honored as they are by the name of profession." This earnest man and careful thinker concludes his letter with these words, "You will think, perhaps, that I am too radical; let me tell you that I believe in the grange as the only hope of our New England agriculture. Hence, my radicalism." If my friend is right, if that is true, would I be justified in omitting to present the grange to you as the strongest business consideration of the day, the light in which I regard it?

To my mind the strongest point in favor of organization is the effect upon the individual. It develops the mind, sharpens the

perception, quickens the intellect, and to a certain extent makes the person a disciplined one. We know the value of disciplined men in war; they are equally so in business. A few months ago I met a gentleman on the train. He proved to be a New York business man. In conversation he gave me an incident illustrating this point. Desiring to obtain situations for two nephews of his who were cousins of about equal ages and qualifications, he called upon a neighboring merchant, and asked if he could give them positions in his store. He could make room for one. The question came which one. In discussing their merits the fact was developed that one of them was a member of one of the finest regiments of the State Militia. At once the merchant said, "I will take him, he is the man I want." My acquaintance was rather in favor of the choice being given to the other, and asked why he chose the military man. The answer was, "Because he is a disciplined man, he can receive commands and execute them, and when required give them. He will be worth more money to me." Here is an instance where discipline brought dollars. Is it not wise for us to look at it in that light also? The Grange gives a uniform discipline to its membership. The various peoples who are represented by our farmers whatever their section or nation, are thus brought to a unity as were the members of our regiments in the late war.

However much organization may benefit an individual he will find that he cannot rest there, he must seek the good results that come from the ordinary forms of business in general use, and apply them to his farming business. As a class farmers are sadly deficient in business detail. Should a manufacturer conduct his operation in such a loose, unsystematized way, he would be sure to fail and receive the verdict "served him right." There is too much guess work about farm business. The book-keeping is not systematic enough. I have seen much of farmers' book-keeping and while admiring its simplicity, I have been impressed with its want of completeness. The day-book, journal and ledger frequently consist of one book, generally a patent medicine almanac kept hanging from a nail under the clock shelf in the kitchen. Here and there on the margin of the leaves against certain dates are entries made of farm events, the sale of the brindle heifer, the weight of the fat hogs, the payment of the last instalment of pew rent, and the number of loads of apples delivered at Deacon Ramson's cider mill. I venture the statement that not one farmer in five hundred keeps a regular set of books, and yet they are ready to contend that farming

does not pay. That will be a more happy question for discussion when they have reformed their business system, and can prove their statements by actual figures.

The great lack of the present system of farming in the eastern States is the cash income. Goods enough are sold but not for cash; they are traded away on the store pay system which is an utter disgrace to any man's business history, the merchant fixing the price both ways and the farmer oftentimes taking goods he does not want. The custom is behind the times, and the quicker it is changed the sooner prosperity will follow.

Specialties of farming can be followed to advantage. The drift of the times is that way. They can be made leading features of general farming. When the special branch is decided upon, push it as business men, talk upon it when occasion offers, advertise it on your letter heads, a thing farmers seldom do, and occasionally in the papers. Let the public know what you are doing, and you will find some of them ready to help you by their purchases. Trying to do business without advertising is said to be like throwing a kiss to a pretty girl in the dark; you may know what you are doing but no one else does.

Politically speaking farmers are a strong power, and in these severely practical days business must seek the aid of every power. By their concentrated vote they can do much towards the election of men who are either directly connected with agriculture or in sympathy with it. They can introduce bills into legislative bodies and thus secure laws that will regulate the sale of milk, butter and cheese, and punish for their adulterations, fix standards for weights and size of packages; make quarantine rules and regulations for animals; pass laws which will prevent contagious diseases from entering their flocks and herds; guard against fraudulent pedigrees in stock; direct congressional and other appropriations of money for agricultural purposes to their proper uses, like the moneys of the Hatch fund so called. Who will interest themselves in these matters if farmers do not? Twined together in an organization like the grange, where these questions are discussed, they make a power that the politician would fear to oppose, but seek to conciliate. Farmers are apt to fear political strength of others and underrate their own. To such we can commend Shakespeare's words:

> —"Take thy fortunes up:
> Be that thou knowest thou art, and then thou art
> As great as that thou fearest."*

*Twelfth Night. Act V. Scene I.

Is not this attention to business? Yes, the very foundation of it, for without proper laws the business would soon be overthrown.

The business of farming is a good one, and for the amount of money invested yields a larger percentage of profit than most others. It gives a home for the family, produces most of the food consumed, and fuel used, affords a horse and carriage for occasional outings, all of which makes the farmer the most independent of all classes. It is not conducted on the borrowed capital plan that we find so extensively the case in callings carried on in towns. It oftentimes has a part of its capital borrowed, which is generally put into one shape, a mortgage on the farm which is handled only at stated times. It is not conducted by a system of notes given at banks, causing a perpetual worry of mind and a speedy turning of goods into cash. Neither has it the system of long credits, that causes the failure of so many others. Its hours are long in summer, but the average working hours of the year are no more than those of the mechanics and tradesmen. The heavier labor of those hours is fully offset by its being carried on out of doors, in the pure air and stimulating sunshine, and the good health it brings.

I would speak of education as a business point, but surely in these days of enlightenment it is not necessary to enlarge upon it. Knowledge is power wherever it is exerted. The farm needs it and responds to it as quickly as in any profession or calling. Ignorance and superstition are incompatible with progress, and it is for progressive modes and conditions that we are living, and not the conservative ideas of the past. Those who would win the golden prize of a successful life must rely upon a strong intellect that can only come from mental exercise.

It is for ourselves that we should seek for business success, for the manhood that is within us, which feels the stimulation that comes as a reward for honest labor, for those who are dependent upon us, and can thus enjoy the comforts a success affords them, and for others that they may be stimulated by our success, and be encouraged to emulate it. To this end let us all take to heart Dickens' comment, that "To be thoroughly in earnest is everything, to be anything short of it is nothing."

THE RATIONALLE OF FEEDING.

By Dr. G. A. BOWEN, Woodstock, Conn.

The true definition of the word rationalle is a detail with reasons, therefore in considering the rationalle of feeding we will give a detail of why we feed our animals, how they extract nutriment from that food, and will follow it with reasons for certain methods and systems of feeding which we will advance. Desiring it to be understood, however, that in the brief time allotted to this paper we can only draw the outline of the subject, leaving to you as intelligent farmers to complete the details by your questions and discussions.

To my mind this is a very practical question for New England farmers to consider; for the old methods of farming which were only allowable in a new country are rapidly passing away. The animal industry of the country if we may so term it has greatly changed within the last fifty years, and will change more rapidly in the next few decades, for, owing to circumstances which we will not tarry here to discuss, the East will not be as dependent upon the West for its supply of animals and animal productions as in the past. They will be grown here. The co-operative creamery system is revolutionizing the dairy interests. We must keep step in this progressive march or be left in the rear ranks, a place I am happy to say New England seldom occupies. As the manufacturer studies economy of production, so must we as farmers, and I trust we shall see equally good results.

The reply of the small boy when asked why it was necessary for him to eat, was, "to make dad shake off his laziness by scratching for us," will not exactly apply to our question why our cattle and horses eat, although it does make us shake off our laziness by scratching for them. We will endeavor to make a little more scientific examination of the question. In the demand for food the whole universe stands upon an equality, vegetable and animal life alike requiring it. The plant, however, differs from the animal in its power of retaining all the increase derived from its food, all received from the soil and the atmosphere remaining permanently in its structure, a component part of the whole which is ever increasing in size (excepting in some of the higher forms which shed their leaves, blossoms and seeds when they have performed their functions). But in the animal economy a constant change is taking

place; decay and death in the midst of life. Where the most life and action are found, there exists the most rapid decay. The animal soon attains its size, and the further supply of food is only necessary to repair the waste that is ever going on in the tissues of the body, and for the creation of heat. The wastes of the system are not proportionate in all. The horse whose muscles move quickly, and whose nervous power is of the keenest order, has a far greater amount of waste than the slow-moving and phlegmatic ox; an important item in our consideration of their rations.

The age of the animal has also much to do with the amount of food required; the young and growing requiring a far greater amount, in proportion to size, than those who have reached maturity. Different periods of adult life also require varying amounts of food. As age advances less is eaten than during the more active periods of life.

The demand for food is not wholly occasioned by the waste of the body. There is another and more prominent source which is the maintenance of animal heat; for in all the higher animals and birds, and to a limited extent, in insects there is a process going on which is analogous to ordinary combustion, which is carried on in this manner. The carbon and hydrogen which are directly supplied by the food, or which have for a time been employed in the composition of the body are set free by the union of oxygen obtained by respiration, and give off as much heat as though the same had been consumed by fire in a furnace. It is an interesting fact to know that the evolution of heat is not confined to the animal kingdom alone; the higher orders of plant-life show by many curious experiments that they possess it to an eminent degree. It is this process of combustion going on in the system that establishes the temperature of the body, upon which physicians and veterinarians depend so much in their diagnosis of disease. The temperature of mammalia ranges from 90° to 104° although higher temperatures are sometimes found, and singularly enough, those animals inhabiting the coldest regions have shown it to the greatest degree; the Arctic fox having been found to give a record of 107° when the surrounding air was at 14°.

To a thorough understanding of the principles which underlie all successful stock feeding, we must have a knowledge, first of animal chemistry, or the constituents of the body, and vegetable chemistry, or at least the part that pertains to the various items with which we feed our stock, also of the anatomy of the digestive organs and

the physiology of the digestive process. The first two subjects are so complex however, requiring so much careful study that we are forced to pass them by, hoping that this allusion to them will prompt you to purchase the works pertaining to them, and make yourselves masters of the subjects before the winter passes. The subject is simple and within the comprehension of every farmer, and, as I believe that *knowledge is power*, I know that it will give you a power in your business.

We will, however, mention the principle sub-division of foods as we may require them in our discussion; to a certain degree they can be classed, four divisions being organized:

First—Carbo-hydrates or compounds which unite carbon with oxygen, such as sugar and starch.

Second—Hydro-carbons, that is unoxidized hydrogen compounds, as oils, fats, etc.

Third—Albuminoid bodies, or those that contain nitrogen. To this class belong albumen, caseine, fibrine, etc.

Fourth—Salts, of which chloride of sodium (common salt) and phosphate of lime, are examples.

Foods are sometimes called nitrogenized or tissue-making, or non-nitrogenized or heat-making.

A brief glance at the organs of digestion must suffice us. Taking them in order of their arrangement we find the mouth containing the teeth and the salivary glands, œsophagus, stomach, small and large intestines, lacteals, thoracic duct, and the accessory glands. Each organ is wonderfully complete in its structure, and when studied in detail excites within our minds an ever increasing amazement.

The mouths of our creatures we are all familiar with, and with the number and character of the teeth, but the salivary glands are less generally known. They are five in number, four of them being in pairs. 1st the parotid gland, the largest of all, is situated at the posterior angle of the lower jaw near the ear; 2d the sub-maxillary is on the border of the lower jaw; 3d the sub lingual which lies beneath the tongue; 4th the molar glands near the molar arches; 5th the lobial, or hip glands. The œsophagus is the passage connecting the mouth with the stomach; and its office is simply that of canal to convey the food from one to the other. It is muscular in its structure and is lined with a mucous surface the same as the mouth.

In considering the stomach it would be interesting to trace it through all the forms of animal life, commencing with a certoid

entagoon like the tape worm, which has no digestive tract, but whose whole surface seems to be a stomach of itself, absorbing by every part the nutritive juices on which it lives, and carrying our observations through the various orders, in each discovering a more elaborate organ, till we come to that of the mammalia, who present the most complete of all, many of them being possessed of a compound stomach, or series of digestive sacks; and, as this is so intimately connected with our subject, we will the more closely study it, although compelled to pass by much that is interesting, in regard to its anatomical structure.

Cattle and sheep have a compound stomach, or in other words a number of them, which is characteristic of the ruminants; here we find that there are four, the first being at the termination of the œsophagus and termed the "rumen" "ventriculus" or "paunch." It is of great size, occupying nearly three-fourths of the abdominal cavity, and has an average capacity in the bovine race of 250 quarts. The left side is elevated so high as to lie in contact with the left flank. It is at this place and into this sack that the trocar is passed in cases of hoven. The second stomach, called also the "reticulum" or "honeycomb," has a very peculiar appearance in its interior, occasioned by the unequal folding of the mucous membrane. It is here that the singular provision of water-cells is found, which in the camel has been developed to an unusual degree, enabling it to go for many days without receiving a fresh supply of water. This faculty is more or less developed in all the ruminants. The third stomach is called the "omasum" or "many plies," from the peculiar manner in which the lining membrame is deposed, which is much like the leaves of a book. This is in order to bring the food in contact with a large surface. The fourth stomach is called the "abomasum" or reed. It is much larger than the 2d and 3d stomachs, but by no means as large as the 1st. This is the seat of the final and true digestion, the gastric fluid being secreted from it alone. It is the lining portion of this stomach in the calf that furnishes rennet, which from its containing an organic acid, possesses the power of coagulating milk as illustrated in cheese making.

Connecting these organs is a membranous canal which is a promulgation of the œsophagus or gullet; a portion of its wall is wanting leaving an opening into the rumen and reticulum. The margin of this opening is of thick folds of muscular tissue which encircle it, and cover somewhat of the surface of the walls of the stomach, and

by its power of contraction can entirely close it, making the passage a continuous one from the mouth to the third stomach. Please make a mental note of this fact as we shall refer to it again. When the muscle is relaxed, the canal remains open and there is no barrier to communication between the mouth and the first two stomachs, or between these stomachs and the third.

The stomach of the solipeds—to which class belong the horse, the ass, and their cross, the mule,—is a simple one, that is, having but one sack. It is situated on the left side of the abdominal cavity, just behind the diaphragm, the great muscle of respiration, every contraction of which forces it back, and the fuller the stomach, the greater the labor of the diaphram, hence, the labored respiration of a horse when rapidly driven after a full meal. The stomach of an average sized horse will only hold about 12 quarts, very small as you see, when compared to the size of the body. Comparing the the weight of a horse with man, it will be seen that it is proportionately only half as large. The stomach of a pig is also a simple one, and much like that of the horse in its contraction, only larger.

The next division is the intestinal canal, which is divided into two portions called the "small" and the "large intestine." The entire length of the intestinal canal in the horse is about ninety feet, or about ten times the length of his body; the small intestine occupying sixty-six feet, and the large, twenty-four. That of the pig is sixteen times the length of the body, in the proportion of three to one, as to large and small. The length in the ox is twenty-two times that of the body, and in the sheep twenty-seven times.

The lacteals are very minute vessels which commence in the villi of the mucous surface of the small intestine and pass to a series of small glands called the "mesenteric glands," and from these to more remote ones; growing fewer but larger every time, till they unite in a single one called the thoracic duct, which is about the size of a goose-quill, growing smaller, however, as its length increases, which is about twenty inches. It lies just over the spinal column, and empties into the sub-clavian vein, one of the large veins within the shoulder and near the neck. The accessory glands are the salivary glands of the mouth already mentioned; the liver, the largest gland of the pancreas and the spleen.

Having thus stated the organs of digestion let us commence in the same order and inspect the digestive process itself, to see how the food eaten by an animal becomes a portion of its living structure;

first stating the general principles of digestion, and then mentioning the departures from that rule shown by the various animals of the farm.

The first process is the mastication of the food by the teeth. This reduces the bulk, breaks up its structure, and with the aid of the tongue mixes it with the saliva, which is a very watery fluid containing only six to eight parts of solid or saline matter in 1,000 but which serves a very important part in digestion. It contains also an active ferment called ptyalin, which possesses the property of changing starch into sugar, thus rendering it soluble. The horse or ox will discharge about two quarts of saliva while eating a ration of fodder. The act of swallowing carries the food to the stomach where it is thoroughly mixed with the gastric juice, which is secreted by minute glands within the mucous lining. The perishable or grinding action of the muscular coats immediately commences and materially aids the process. The action of the gastric fluid is purely a chemical one, dissolving the food, thus making its absorption an easy matter. Some articles also undergo a complete change by having their component parts altered by this fluid. The food when dissolved is about the consistency of cream and is called "chyme." It passes into the small intestine where it receives the bile from the liver, and the pancreatic fluid from the pancreas. By the action of these agents it is converted into a fluid of a whitish color, called "chyle," and a residuum which passes on to the large intestine, and is excreted from the system. As the contents of the intestine move downward the chyle is taken up by the villi or mouths of the lacteals, and is carried into the mesenteric glands where some change is supposed to take place in it but which is not thoroughly understood; from thence it flows directly into the blood through the thoracic duct. The true office of the spleen is not known. This then is the usual course of digestion, omitting many minor details. Let us now look at the departures, gaining if we can any practical points that will aid us in feeding our stock at a profit.

Digestion takes place in the horse in about the way that we have stated; but there is a peculiar anatomical structure and consequent physiological condition that belong to this animal, that are of deep pecuniary interest to us. The head of the colon or commencement of the large intestine is very largely developed and capable of holding four gallons of fluid. The stomach as stated is small. We often—that is, you do, I do not—feed our horses hay which when

masticated would equal ten quarts, then give in addition four quarts of grain, equalling fourteen quarts, which completely fills the cavity. The horse is then led to the pump, and allowed to drink fourteen quarts of water. It would seem at the first glance that here was a case where figures did lie, but we find that they do not, for the water does not remain in the stomach, but passes through and goes immediately to the enormously developed head of the colon, taking with it much of the grain and the finest and most nutritious part of the hay, leaving it where it cannot become digested, but is voided with the excrement, the animal gaining little or no benefit from it.

The intricate digestion of the ruminant will interest us by following it more closely. Let us trace the progress of the food through the different stomachs. The first mastication of the food receives but a few strokes of the jaws, just sufficient to compact its bulk, and thoroughly mix it with saliva. It is then swallowed and goes directly to the paunch or first stomach if it is coarse, fibrous and bulky, but if fine and soft, like pulped roots and grain, much of it goes straight to the third stomach. As a general statement we can say that it goes to the paunch; where it remains for some sixteen or eighteen hours, sometimes as many as thirty. When sufficiently softened by the saliva and the bodily heat and ferment, it passes into the second stomach or reticulum where it is rolled into small balls and mixed with water and returned to the mouth. Here it is remasticated and some saliva added. When again swallowed it does not return to the first stomach, but to the third, where it comes in contact with the many plies, which by their grinding action more thoroughly tritarate it, it is macerated and softened, and prepared for the actual digestive process which takes place when it has slowly found its way into the fourth stomach, where alone the true gastric fluids are secreted. The chemistry of these fluids, how they act upon different foods, how the albuminoids and carbo-hydrates are digested, which of the constituents are absorbed by the blood vessels of the stomach, which by the lymphatics, the action of the bile upon the chyme, or partially digested food, when it has passed into the intestines, the microscopic structure of the various glands and absorbants, would make a long chapter for consideration: more intricate than a Chinese puzzle, but thoroughly understood, and of more interest than the "labor question," and an aspiration to master it will be found to pay better than an aspiration for political office, hence I commend it to you.

With a brief glance at the digestion of the pig we will leave the subject. The pig is noted for its capacity to digest and assimilate a large amount of food in proportion to the weight of its body. Its digestive organs show how this is brought about. Those enthusiastic experimenters, Messrs. Lawes and Gilbert of England, have devoted months of intelligent labor upon this subject, and they found that the pig utilized more of the nutrients of his ration than any class of domestic animals, which they explain by a table showing weight of *stomach and contents* proportioned to that of the body.

In oxen about 11½ per cent of the entire weight of the body.
Sheep " 7½ " " " "
Pigs " 1¼ " " " "

On the other hand the *intestines and contents* hold the reverse relation. Of the entire weight of the animals, these amounted:

In the pig to 6¼ per cent.
Sheep to 3½ "
Ox " 2¾ "

These facts they say explain why the ruminant can thrive on food containing so large a proportion of indigestible woody fibre, while the pig takes so large a proportion of starch,—that in them the transformations are performed in the abnormally long intestinal canal, which enables them to digest and assimilate larger proportions of food in a given time. As practical feeders, farmers are ready to verify this statement by their experience, for they find that the pig will show a greater gain from a given amount of food, than any other of our stock.

It is only of late that the practical feeder has devoted much time or thought to the aid that he can derive from a study of comparative anatomy and physiology, but the time is not far distant when it will be considered as of as much, or even more importance to him as to the physician; he certainly would make as practical a use of it. Let us now consider how we can apply the ideas that we have gained in our superficial examination of the subject.

Many, and I think the majority, of stock men feed their horses three times a day. But I think that the most successful and economical horse feeders that I have known, have given four feeds a day. Whether it would be economy for farmers to stop their work and do this is another question; most of us find that "chore time" comes often enough as it is. The majority of horses are overfed in

the hay ration and underfed in the grain ration. There is no doubt in this. Chemically considered it is an imperfect ration, and if we examine further we find that the principal grain fed is corn, an imperfect ration again. It is the cheapest food if we look upon it only from day to day, but if we consider the *useful* years of a horse's existence of value we will find that exclusive corn feeding is extravagant, for he can do less work upon it, he dies earlier, and is more subject to disease. The value of cut feed, of coarse and fine hay, oat straw and roots, etc., as rations for our horses, I will leave to you to bring forward in your discussion.

In feeding cattle and sheep we have quite a different problem to engage us, for here is the enormous paunch for the storage of a supply sufficient to last for a long time, and by too frequent feeding we interfere with the animal's time for rumination, the digestive process is more impefectly performed, and we find that we are feeding to a waste by the digestive organs not extracting the maximum amount of nutrients from the fodder. Twice a day is often enough, the first thing in the morning, and at 3 o'clock in the afternoon, commencing with the poorest hay and ending with the best, followed by roots and meal; or, and I think this a preferable way, cut all poor and rough fodder, dampen it and mix the grain ration with it. In this way the cattle get no poor feed and all is closely eaten. When the feeding is done, which will take fully two hours or more, turn the stock to water, seeing that each animal has a full supply. A cow will drink more water after eating than she will after she has commenced to chew her cud. When thus fed she has nothing to do but to quietly go about the business of digesting it, she gets more benefit from it and allows the farmer a little more time for his business.

Too much cannot be said in favor of cutting fodder for horses, cattle, sheep and swine. It is a matter of great economy, and in these days of low prices we have got to study economy of production or suffer in our cash profits. There are too many articles that have been underrated by the New England farmer. He puts much good material under his stock that had better go into them, and this cutting and mixing process enables him to feed it.

I have mentioned cut feed for swine. Why not? We all admit that swine do excellently well when turned into a clover field, and have noted how voraciously they eat fresh clover when brought to their pens. When you get home try cut clover hay soaked in hot water a few times, and you will advocate it with me.

I am aware that I have but briefly touched upon a few of the leading points of this subject, condensing much that could be extended, and leaving out a deal that is of interest, and occupying the minds of feeders and growers of live stock all through our country, embracing the subjects of ensilage, cooking or steaming of foods, the balancing of rations chemically considered, feeding of adult, or young animals, feeding for fat, for muscle, or speed. The consideration of food elements in the atmosphere and in water, and a host of other subjects of equal importance, but should I extend them, a book would be the result, and not a simple paper, but I cannot leave the theme without speaking of one of its most important branches, which is regularity of time for feeding.

There is but one set rule in the feeding of our animals, and that is regarding time, for each individual animal will have varying peculiarities which the watchful observer will recognize and comply with, regarding general principles only as a whole. Regularity of feeding is the fundamental point for a good digestion, without it the animal is worthless. Their bodily wants tell them of the lapse of time as quickly as our own tell us, and should be as systematically attended to. The word regularity should embrace more than time, it should cover quantity; when the capacity of each animal is ascertained it should be closely followed.

The old saying that "too many cooks spoil the broth," applies to the stable as well as to the kitchen. The feeding should always be done by one person, who will soon learn what each animal will consume; and none will be under or over fed. Salt will be administered regularly; they will not be uneasy or expectant when others are around, and if anything is wrong with them, we know just where to place the blame. Give your cattle good care and they will amply repay you. Feed regularly and feed well, let the breed be what it may; this applies to all. The most available wealth of the New England farmer is in his stock; it is the life of his farm, and it should be as zealously cared for and improved as is the capital of business corporations. With improved stock and improved feeding, we find the farm improving, and best of all, in an improving farm we find the incentive of a progressive farmer.

BREEDING FOR SPECIAL PURPOSES.

By GEO. AUSTIN BOWEN, Woodstock, Conn.

Read at Institute at Springvale.

Of all subjects connected with agriculture there is none of more antiquity than the subtile one of breeding, for it is one of its two primary divisions, which are the production of crops and the production of animals. The two go hand in hand, each dependent upon the other.

When savage man relied upon the products of the chase for a living, his needs obliged him to hunt daily for his food, like the beast of prey. But, with the dawning of intellect, he found that he could subjugate many of the animals of his pursuit, and have them on hand to meet the wants of his condition. Thus many became domesticated. In time flocks and herds were formed. Man left the savage and entered into the nomadic stage of his existence, driving his flocks from place to place as water or superior pasturage offered, ever on the alert for enemies that would rob him of his possessions. The large tracts of land needed for his sustenance compelled him to a roaming life; but the wants of a fortified home in which to guard his possessions forced him to cultivate the land in order to remain in one place, for he could not carry his fortification with him, neither could he be continually fortifying new places of abode. Thus man became settled, agriculture came into existence, and with it grew the breeding of animals, each necessarily crude in its way, without developing the slightest knowledge of the principles that modern research and investigation have discovered to underlie them. Till within the last century the art of breeding was unknown, and was but the individual experience of the man, or vague and unsubstantial traditions of the past, misleading rather than guiding him. Breeding and agriculture have grown slowly, and have had to fight their way to a scientific position as have the other professions. An exact science has not come out of them yet, for we find that we cannot produce desired animals at will every time, but science has reached this point, it tells us why we cannot. Knowing this point, I think the time will come when the breeders of all classes of our domestic animals will produce to order, filling contracts as to color, contour, endurance, milking qualities, weight of fleece, etc.

The scientific principles of breeding are yet in their infancy, and much careful investigation, accurate experiments and testing of existing theories must be undertaken. The field is a large one and requires many workers. We need agricultural schools and colleges and experiment stations to develop the men who are to solve these problems, for existing classical institutions educate men away from the farm and its themes, and not towards it. The future scientific investigators of these subjects will be from the farm as they are now. I am informed that there is not a prominent naturalist in the United States who was not born and educated upon the farm. The relation of this question of breeding to the prosperity of our people is one of immense magnitude and should influence legislation in its behalf. Farmers, in this connection, the question will in time be brought to you; see that you are prepared to meet it.

The part that domestic animal life fills in our agriculture is an interesting subject of consideration, but time will not allow of our developing its details. Without presenting statistics we know that the number is simply enormous, and must necessarily augment by reason of our rapidly increasing population. The present ratio to the population will probably increase by reason of our growing export trade.

The horse in agriculture is a theme we hear spoken of everywhere, but in addition to his work on the farm, look at the immense numbers that are required in the business of the country, to say nothing of those devoted to pleasure; the ox as a beef producer to supply our tables. How shall the countless numbers that are now roaming our western plains be not only sustained, but improved, as population reduces the magnitude of the ranges? The cow and her relations to our dairy products, the enormous traffic in butter and cheese, the milk supply of our cities and towns, the production of wool, in all its various grades, whereby our vast population may be clothed, how many uses the flesh of swine fills, and how many millions are annually butchered, and that lesser item, but by no means a small one, poultry for the table and the production of eggs, are all questions of great moment. To produce these cheaper and better is the aim of the breeder, and when we consider that the lives of all our domestic creatures are short ones, and that the ranks must be kept full, it certainly looks as though the business of breeding will be a good one for some time to come, and as the tendency of the times is for

classified animals, we must learn to breed for special and well defined purposes.

Let us look at some of the material of our stock to-day, and we shall soon see wherein the strong fundamental principle of breeding has its existence, taking for our example the cattle of our farms. Here we find the "native" (which is not a native), or, as it is called the scrub, grades, crossbreds and thoroughbreds, the latter presenting some of the best specimens of the breeders' art, and the question naturally arises, from whence do they come. The answer is easy, from England, Holland or Switzerland, as the case may be, but, like questioning children, we desire to know how they came there. Breeders perfected them, you say. From what? History answers from the breeds that existed when these men took them in hand to develop them, and mainly from their own blood alone. The English breeds were probably established during the Saxon rule, which lasted from the 5th to the 11th century. The subjugation of the country by the Normans was followed by its division into large estates and given to the followers of "The Conqueror." There was but a limited intercourse between the inhabitants of the various parts of the island. The roads were miserably few, and those few wretchedly poor. In short, people had to remain at home and their cattle became localized, and, in time, were regarded as indigenous to the section. The soil upon which they were reared and the treatment they received, gradually developed them into breeds with distinctive characteristics. The same isolation has developed the cattle of Europe and of the channel islands. These isolated herds interbred among themselves for many and many generations gradually assumed a sameness, their characteristics became fixed, not only their original qualities but those induced by their surroundings, and were sure to be reproduced in coming generations, by the law known to us as the law of heredity, or inheritance, the prime law of breeding.

Next to the thoroughbreds we have a few crossbreds, animals, whose parents are both thoroughbreds, but of totally different breeds. But far surpassing them in numbers, we have our graded stock, that is a cross of the thoroughbred upon the native stock. Almost every farmer will show with commendable pride animals of this class.

Our so-called native stock is a curiosity. In the first place it is not native, but an interbred graded stock, derived mostly from the

cattle of our English ancestors who settled here some two and a half centuries ago. They came from different districts and brought their good old mulleys with them. There was the beautiful Devon, the Durham, the Longhorn, the Hereford and later the Ayshire. The Scotchman brought his poled cattle, or doddies as he called them, with perhaps an occasional highland cow; and the Dutchman who settled New York brought the good old dutch standards with him. What varied material this was for a cattle show. Had the spirit moved them, they could have established one that would have rivaled some of ours of the present day, for I doubt if a more diversified set of animals was ever brought together. These have been interbred and mixed together till our American cow is like the American himself, a combination of all European bloods. Many of these cattle are excellent, or even superior animals, but from whence these good qualities came and how surely they will be perpetuated no one can say. As a whole they are not superior, and the only general characteristic that we ean attach to them is that given me by a neighbor who in argument with me a few weeks ago said, "you can't make me think that the native ain't the best cow, for you must admit that they are tough."

By close observation physiologists have discovered that in breeding animals for any direct object they must consider the laws of nature, laws that she implanted at the beginning of life. Left to itself all life would but reproduce its kind; there would be no improvement. Darwin's theory of the survival of the fittest, would perhaps in ages bring about a change, but man desires the change to take place in his day, impelled to it by his needs, by his selfishness, arising from business considerations and from the interest he finds in being able to change and modify nature. To do this he recognizes several general laws. The first is *heredity*, by which is meant the transmission of paternal characteristics to the offspring, and here is the main dependence of the practical breeder, for if the product was uncertain, there would be no interest beyond the mere fact of the perpetuation of the race. It must be borne in mind that all the characters of the animal can be transmitted to the progeny, the evil as well as the good, till it has become a common saying that *like produces like.* Hence breed from good animals and the chances are in favor of obtaining good ones. Breed from those without vigor, without constitution, and the desirable points of excellence, and their progeny will as surely possess these evils. In the human

race we have many familiar examples of the transmission of disease from parents to children, or, as it will sometimes skip a generation, from grandparent to grandchild. Diseases in our farm animals are transmitted in the same way. Diseases arising from accidental causes are also transmitted or more properly speaking, a tendency towards them. Thus a colt will not inherit a spavin from his sire, but he will receive a tendency towards it that will the more easily develop one on the first favorable occasion.

Acquired characters are also transmitted, enabling the breeder to retain possession of characters that he has developed by his own care and skill. The setter dog is a good example of this; the habit of "pointing" at game and standing staunchly at the point is an acquired one, but so strong has the habit become fixed that the young pups of only a few weeks old will stand a good point on the chickens and pigeons about their kennels, and when taken into the field for the first time will work as steadily as old dogs. Longevity or its reverse, fruitfulness or sterility, are transmissible points, so are mental peculiarities; disposition that stallion keepers talk so much about, style of action, carriage of head, length of stride, &c., are all familiar examples.

It is upon this law of heredity that the thoroughbred has been developed, and upon it is the pedigree system based. The theory is a sound one and I wish that it was more universally respected. The bare fact that an animal has a pedigree extending backward over fifty generations, does not add one cent to its value, unless it traces through a line of superior ancestry. The mere record of a list of indifferent and unknown names in a herd book will not improve the beef or milk product. But if the pedigree can go back by successive steps to heavy milkers and good feeders, and to an ancestry devoid of disease, the farmer or breeder can not only count upon a superior animal, but upon one that is better than its predecessors, by reason of another law of nature that we will soon speak of.

It is a very common thing to hear farmers say that they would not have a thoroughbred on the farm, declaring that they are tender and delicate. I think that idea originates more in prejudice than in actual observation. Closely inbred animals whose constitutions have been weakened by the process are certainly more delicate, but there is no doubt of the fact that the average thoroughbred will compare more than favorably with the average cattle of the country in this respect.

I have noticed that manufacturers are constantly endeavoring to save an unnecessary expenditure of material, and yet preserve the strength and beauty of the article. They examine and test critically in order to save a bit of iron of only a half ounce in weight, the idea being that though small in itself, in the general aggregate these unnecessary parts cost a great sum and so reduce the profit. The grower of animals has done the same thing. He has bred off superfluous parts. In sheep, horns have disappeared (much to the satisfaction of those who remember vicious rams), as they also have in several breeds of cattle, and in many others the size has been lessened. The bone has been consolidated, and, although not as large, it is much stronger. The carcass has been developed, unsightly hollows of the body have been filled, good parts strengthened and made better. The actual, practical value of the beast is greater, to say nothing of that important feature, *symmetry of form*, which so delights the eye. With regard to this point we must pause to say one word; it has more value than the simple pleasure it gives, for it is an expression of the actual utility of the animal. Take for example a well bred Short-horn steer that "completely fills the eye," as it is expressed. Apply the tape measure to him; examine his form of profile, comparing it to the geometrical figure of a parallelogram. Then taking the rear view and comparing it to the square, placing an accurately constructed form on him if need be, and the same with the forward view, and one will be surprised to see how the instinct of the untrained eye will compare with the theory and work of the breeder, showing that symmetry is an all important feature of our breeding.

The second law recognized by the breeder is that of *variation*. It is not as deep rooted or as powerful as the law of heredity, but quite as general in its character. We find that there are individual differences in the members of a family, and that the offspring of any one pair of domesticated animals do not precisely agree with themselves or their parents in bodily conformation or physical character; we recognize at a glance the general sameness of a litter of fox-hound pups, yet upon closer observation we find that there is quite a wide variation when compared with one another. We cannot trace to any influence of external circumstances this tendency to variation, but as there must needs be a cause for all effects we look for this cause, and think that it is found to be due to the agencies operating unobserved upon the parents at the time the germ is

quickened into life, or during the anti-natal life of the being. This theory is frequently confirmed in the practice of physicians where such impressions are watched for with greater interest and the results of these agencies more carefully noted. Perhaps no better illustration of this general fact can be found than in the domestication of wild animals which are notoriously of a uniform color, which shows a tendency to change, their offspring showing a want of constancy as marked as the uniformity is in the parents. Here is one of the strong points of the breeder, for by taking advantage of the former law of heredity, he can retain many valuable points that may from time to time appear, for they can be transmitted as well as the established ones. If two animals can be found having this new departure and they interbred, it is more apt to become fixed in the pregnancy. Without being thus fixed these variations would soon become lost, and not again seen; the free intermixture of animals possessing it with those which do not depart from the ordinary type, tending to merge it into the general average. We occasionally find children born with six fingers or toes which is another illustration of sporting, as variation is sometimes termed. If at maturity these children should intermarry and continue so to do for a few generations, the extra digit would become a fixed fact, and we should have a new family or race. But suppose our variations do not become fixed, but allowed to disappear, are they lost forever? Not always, they may occasionally crop out in succeeding generations; their first appearance to us may be but the reappearance of a feature of some remote ancestor. This condition is termed *atavism or reversion*, and is oftentimes a great help to the farmer who seeks to improve his stock. Change in form and structure may also come from the surroundings of an animal, the soil from which their food and water supply is derived, the abundance and character of the food, climate, shelter, &c., &c. For convenience these conditions are termed the *environment.*

Another law of breeding has been sharply questioned by many scientists, but I think is now accepted by the leading minds as a true one; it is a law opposed to heredity, a much weaker one, but under certain circumstances can overcome it. It supposes that nature in the beginning implanted an inherent tendency to change in the growing young. It is a law differing from variation although at first thought it appears to be closely allied to it if not the same. *Change* is a law of breeding. It opens the field of the breeder to a

wider expanse and gives him almost an unlimited power to improve his breeds or families, by discovering new conditions, which again, by the stronger law of heredity, he can fix and forever retain.

Now, let us apply these theories to our actual practice, and what do we find? This, that theories become living facts, for we see that animals which have been bred together for a long time are the surest to transmit their characteristics to their offspring. The law of heredity is strengthened in each successive generation, and becomes the paramount law, thereby enabling the breeder to more surely obtain stock similar to that which he has in hand. He can do more than this, he can excel previous efforts in each successive generation by changing the conditions of his environment; by better feeding and shelter he can induce certain gradual changes which he can use to advantage, and thus mould his herd into better shape. We also find that we can quickly bring out the law of change by crossing purely bred animals of different breeds. There is in this case a conflict, so to speak, of the hereditary tendencies of the two animals, and the strength or force of the law is interrupted; the law of change so long kept dormant asserts itself, and we obtain an animal differing from both of its parents. Breed the offspring of this cross together and we find that this law of change having gained the ascendency, asserts its sway with still greater force and the variation becomes more marked. These crossbred animals are generally superior to their parents in energy and fertility and in many of the practical uses for which they are bred, whether beef, mutton or milk, or strength and endurance as in horses, and by reason of these good qualities are sought for by farmers, the idea being that they are so excellent in themselves that their blood must improve their stock. This is a wide prevailing fallacy and sure to end in disappointment, for variation once established continues and we everywhere see a tendency for crossbred animals to degenerate when bred together, but when bred back again to either of the parent stocks a marked tendency to improvement follows.

Many attempts have been made to establish new breeds by using these crossbred animals, but I do not know of a single authentic case. Good breeds, however, have been created by the admixture of several breeds. The Ayrshire cow, Poland China swine and Plymouth Rock fowl are well known examples, but it requires very careful selection and a long time to fix the type, they will revert so easily, as is the case in Plymouth Rocks. Breeders frequently in-

form me that they find a pure white or a jet black chicken appearing, taking back to the White Cochin and the Black Java, two of the present breeds.

One interesting feature in breeding the progeny of crossbred stock is their tendency to revert to a primative type. An acquaintance of mine states that in riding through the country with a friend a few years ago, they saw grazing in a field a white heifer with brown ears, the hair being rather long and curling, the type of the Chillingworth cattle, an original wild breed of Europe. It was so exactly like them that he made a bet with his friend that it was the product of crossbred animals. They stopped at an adjoining farm house and inquired. The farmer said that he owned it, and that it was of common native stock and had no "blood" about it, and referred them to his next neighbor who bred it. Another bet was placed that the farmer was mistaken. Inquiry of the breeder developed the fact that the animal was the progeny of crossbred Jersey and Ayrshire cattle. Such instances can be multiplied without number.

In and in breeding is a practice that has been followed by all improvers of stock, and has been much decried by writers on farm topics who advise farmers to let it alone. This is good advice. The ordinary farmer had better purchase his males from a breeder of good reputation than to trust to a risk of ruining his stock, leaving to the professional breeder the task of working out such problems. The aim of inbreeding is to establish a fixity of type, and in the hands of a judicious man who fully understands his material, a great advantage will result. The comparisons so frequently made to the human family should not be allowed, for the circumstances are so entirely different as any one can see by giving a little thought; inbreeding for animal products is one thing, for intellect, nerve-force and sagacity is another.

The influences of parental characteristics upon the progeny are interesting studies, and many theories have from time to time been brought forward to indicate which characters are imparted by the sire and by the dam. I know of no known rule further than that the animal portion seems to be derived from the male and the organic from the female. The former will be chiefly manifested in the external appearance, in the general configuration of the head and limbs, in the organs of the senses, and the locomotive power; while the latter is shown by the size of the body and in the mode in which the vital functions are performed. As an example, take the

mule, which is the product of the female horse with the jack or male ass. It is to all appearances a modified ass, having the general configuration of its sire but possessing the rounder trunk and greater size of its dam; whereas the hinny, which is the converse of the mule, that is, its dam is the female ass and its sire a stallion, is essentially a modified horse, having the general configuration of the horse but being a much smaller animal than its sire, approaching its dam in size and showing her narrowness of trunk.

The laws governing the sex of animals are guarded by an impenetrable mystery, and I very much doubt if they ever will be fully cleared away, although much study is being given to it, probably more than to any other point.

In the perpetuation and ennobling of the human race, we find a very important consideration in the happy blending of the temperaments of the parents. Numberless volumes have been written upon the subject, many of them visionary and absurd, but we are beginning to understand it, and we know that the mental condition of man and the vigor of his constitution depends in great measure upon the affinities of his parents' temperaments. These theories can to a certain degree be applied to the breeding of stock. But who knows the temperament of his animals and can read their physiognomy? Not one in a thousand, yet it can be learned, and it is wonderful when one's attention is called to this point to see how soon a considerable knowledge can be obtained. Rarey, the celebrated horse tamer, understood this thoroughly, and could read the temperaments of horses as easily as a phrenologist will the human. By this knowledge, in connection with self control, lay his whole gift in training horses; had he applied his knowledge to breeding them he would have been eminently successful. Here opposites should mingle; a nervous temperament should never unite with another, but we should seek to reduce such by uniting it with one of less power. In breeding horses we use the term nicking to express our meaning, although it is sometimes used in a more extended application. The breeder of horses should have a thorough knowledge of this point. The lack of it will help to explain why horse breeding is so uncertain.

Another theory has come forward in recent years that may considerably exercise the mind of the farmer in his breeding of dairy stock, called the theory of Guenon, known also as the escutcheon or milk mirror theory. To thoroughly comprehend it a deal of

study combined with observation is required. Most all farmers and breeders recognize the truth of it in the main yet look upon it as a sort of puzzle that they cannot solve. As it is not a law, but a result of breeding I merely allude to it in passing, yet it should be taken into consideration in the mating of dairy animals.

Having thus reviewed the main features of the art of breeding, let us see how we as New England farmers can best apply these laws to our advantage. But the moment that we begin to investigate the subject, we find it to rest upon another which is, what is the special object that we are to breed for, and beyond this still another, which is, what is to be the agricultural future of New England for the next twenty-five or thirty years? To answer the last question first, I think that we are justified in taking a very hopeful view of it, and to anticipate the fact that we are to become celebrated for dairy productions, our neat stock, and especially our horses. I am led to this view by reason of the drift of the events of the last year. Oleomargarine which threatened the total annihilation of the dairy has been placed under the ban of both State and national laws. New England, I believe, was foreordained to take the front rank in the dairy business of the country, because of her sweet pastures and pure streams. These laws will enable her to compete with the shoddy butter of the Chicago slaughter houses. The Inter-State Commerce laws now enable us to market our productions at fair rates, and for these two laws we may largely thank ourselves, for as farmers combining through the grange we have aided in bringing them about. The west is becoming filled, her large farms and ranges are being sub-divided and stock will not be raised there in such wholesale numbers as heretofore. The new rates on the railroads instituted by the all-wise Inter-State Commerce law will make the transportation of that stock far higher than formerly, thus New England will stand a better chance. Heretofore we have had to pay more to place a horse in the Boston market than did the farmer of Illinois. Secondly I know that eastern-bred horses are worth twenty-five per cent more than those of the west, a fact that is beginning to be realized. We are learning the scientific modes of farming and on the whole I believe that our farms are improving while those of the west we know are being "skinned." We see, then, a bright outlook for the breeding of horses, of dairy stock for butter, cheese and milk, and that we must apply our knowledge of the laws which govern breeding to specialties in these directions.

The American is essentially a worker, and to carry out his work must have teams of suitable strength and character. In breeding, the most profit will accrue to him who breeds that for which there is the greatest demand. A novel written for the multitude will pay better than a scientific treatise, because there are more who demand it. The same with horses, breed those for which there is the greatest call, and the sale will be quick and the money sure. We require a good class of horses on our farms and in the business of the country, and their breeding on our farms if rightly conducted will pay, and I know of no better way of turning our farm crops into cash than this. The class of horses represented by Maud S., have their place, but the breeding of this class should be limited because of the limited demand. The man who breeds such animals should make that his special business; the detail is too great for the ordinary farmer to undertake. Good powerful roadsters, such as we get by a cross of the best horse of the world, the American thoroughbred, upon our large mares; coach horses of the Cleveland Bay type will always be in demand. But the business horse should have somewhat of the blood of the Percheron, and the more of that blood that flows in the veins of the draft horse the better. The Percheron horse is developed by early work, paying his way almost from the beginning, differing in this respect from the trotting horse, which should not be used too early, but must be kept till fully matured. New England farmers have said a good deal against horse breeding; there is a strong prejudice against it, arising oftentimes from losses which they have sustained. It is because they have been carried away by the whirl of excitement that has turned the brain of all in favor of the American trotter, a high perfection of the breeders' art. With imperfect knowledge the farmer has tried to breed for speed from unsuitable material. Take the average of New England horses and they will scarcely rank above fair; breed them to trotters *for speed* and in thirty-nine cases out of forty it will not be obtained, resulting only in a fair horse that will not pay for the cost. Breed these mares to a thoroughbred Percheron for business or draft and in thirty-nine cases out of forty it will result in a horse that possesses the character he was bred for, and one that will sell for a handsome profit above his cost. The Percheron horse is a thoroughbred animal, the American trotter is not; it is a grade of the English thoroughbred, and the same rule that applies to grade and crossbred cattle will apply with equal force here.

Another class of draft animals is coming into vogue again which our farms, especially outlaying ones, can raise to advantage, and that is working cattle. The merits of the ox as a worker are too well known to speak of here. There is much that can be said in his favor in comparison with the horse. The demand for them in many sections is increasing. One of the best farmers in Connecticut, a short time ago, showed me thirteen yoke of cattle in his stable all of his own raising, said that he never sold his calves to the butcher, but raised them as steers, and in that way they sold quickly and at as good a price as could be obtained for thoroughbred bulls.

Swine must always have a place on every farm. They occupy a niche that no other animal can fill, but who can say that they have made money in raising pork the last few years? Yet as we cannot do without them, there is all the more reason for breeding them carefully, selecting those which are early in maturing, and do so at the least cost.

Of poultry, the smallest item on the farm, yet many will aver the most profitable one, according to the money invested, much can be said. The numberless breeds, their beauty of plumage and their great utility as food producers, make them general favorites. To breed them better is an interesting study, for as they throw a new generation each year the breeder soon sees the results of his labors.

Thus it would seem on completing this review of the field, that the farmer has much encouragement to breed for special purposes. He should, however, always keep in view in so breeding that the greatest profit comes from a special breed for a special object, and select that breed as his that has the characteristics that he desires, and adhere to it, grading his animals nearer and nearer to the thoroughbred with each generation; for the thoroughbred is the animal par excellence in its special direction. In it alone is the law of heredity firmly fixed. A butter producer from the thoroughbred will beget a butter producer. The cheese-making Ayrshire cannot bring forth an animal that will astonish the world with its butter production. The law of heredity will not allow of it. Bred for milk and cheese, it can only beget animals that will be famous in this direction alone.

We find farmers varying the character of their herds from year to year, by the infusion of the blood of different breeds till they have been the rounds, and all the time producing butter as the main business of the farm. What is the theory for the support of this

practice? An animal will take after, as the expression is, some one of its ancestors, either its immediate ones or its grandparents, or farther back than that even. It has four grandparents, all differing. Can a farmer breeding for butter, or for evenness and fineness of fleece trust to one chance in four of attaining his object? for it may as well take after one grandparent as another; or it may take back to a great grandparent of which there are eight; or to a great great grandparent of which there are sixteen or thirty animals in all. The yankee has the reputation of being intelligent and shrewd and withall a little close. Does he not raise the question whether he can afford to run such chances? It seems as though the risk was a little too great.

The successful breeder must, however, do more than persevere in one direction. He should strive to improve his stock beyond that of its parents, remembering that the environment may develop them further than the law of heredity would if left to itself. To secure advantage from this he must give his animals care, keeping them in the best of health. To this end he should understand hygiene, or the laws of health, and be conversant with the best methods of feeding them, bringing to bear a knowledge of food values, the physiology of nutrition, digestion and growth. He must have a thorough idea of the form or type that he is breeding to and select his animals accordingly.

These ideas are exemplified on many farms in New England to-day. They are not new ones and are not visionary ones, but are the results of actual experience.

Perhaps these laws are not as marked as they might seem at the first glance, but upon close inspection and comparison, one becomes astonished at their great uniformity and power and perceives that they were established at the beginning of life on our globe; why they were so established we cannot say, but must content ourselves with the words of the Psalmist who declares that the ways of the Lord are past finding out.

BARN MANURES AND THEIR APPLICATION.

By R. W. Ellis, Member from Waldo County.

When our fathers cleared these farms upon which we live they found all the elements of plant food in the soil necessary to produce almost any kind of crops they wished for a long series of years; and had they understood then, as bitter experience has taught us, the necessity of returning to the soil a fair equivalent for what they took from it they might have been in the highest state of fertility to-day; but without going into details suffice it to say they did not follow such a course, and consequently, the most of us to-day find ourselves with badly run-out farms upon which to raise our crops, and our products are brought into open competition with the markets of the world in their sale. Not a very pleasant situation to contemplate! As one of the aids out of this unpleasant dilemma, it is allotted to me, as far as in me lies, to point out to you the best method of obtaining, and time and manner of applying, dressing to the soil. In order to illustrate the importance of this subject let us look at it as a matter of business—the same as the business of the merchant or manufacturers. They have their bank with which they do business, depositing their money and drawing checks to pay their bills.

The farmer's soil is his bank, and his dressing is his deposit; and when he draws on that soil by putting in his seed in spring, it is just as unreasonable to expect his draft will be honored by good crops at harvest time without a sufficient amount of plant food deposited there, as it would be for the merchant or manufacturer to expect his drafts to be honored without a sufficient amount of cash on deposit with which to pay his checks, and more so, for the merchant may so establish his credit with his bank that he may overdraw and pay in the future. But Nature's laws are inexorable; it is advance deposits she exacts every time. I want the importance of this kept constantly in mind as I proceed.

HOW TO OBTAIN IT.

On the first part of my subject, that of "obtaining dressing," I do not propose to go into all the minor details such as utilizing the sink spout, water-closet, hennery, wash from the highway and other kindred sources. Not that they are not of importance, but

there is so much said and written upon them that I don't wish to take the limited time allotted me in their discussion. I propose to speak of the main source; feed out all the crops you raise, sell beef, pork, butter, cheese, wool, mutton, etc., etc , etc.

But I am met at once with the assertion that these products are so low it doesn't pay so well to manufacture them as it does to sell the raw crops, such as hay, oats, &c. Let's see. There are some facts in agriculture that have been thoroughly established and stakes driven down. One of these is that every ton of hay we raise takes from the soil an average of five dollars' worth of plant food reckoned on the basis of the cost of commercial fertilizers. Now bear in mind we have got to keep that deposit in the bank good, and if every time you haul a ton of hay to market you have got to go over to the fertilizer store and pay out five dollars of what was received for it, it will make quite a difference in the relative profit of selling hay or feeding it out on the farm. Stock husbandry is not a part of my subject. If it were I think I could prove to you there was more profit in selling hay to your stock than in pressing and hauling to market, saying nothing about the manure.

Assuming you are going to feed out your crops, it is my province next to point out the way to get the most dressing out of them. Another of the established facts in agriculture is that the liquid voidings of the most of our stock are worth as much for plant food as the solids, and if we want to get that five dollars' worth out of every ton of hay we feed we have got to save the whole. The most of us save the solids, though some lose quite a large part of the value of that, even, before they get it covered up in the soil. But how many of us save any considerable portions of the liquids? I leave that question for you to decide for yourselves. But because we do not is no reason why we cannot, and it is a part of my mission here to urge the importance of this upon you, for I consider this one of the greatest losses the common farmer suffers. There are two ways of saving this: One by having a water tight tank or pit under the barn or just outside and conveying the liquids into it by spouts, and pumping therefrom into something like a street sprinkler, made by mounting a hogshead tub on wheels and hauling to the field and applying in liquid form.

The other and more common way is by the use of absorbents. In either case a barn cellar, although not absolutely indispensable, is very much the most economical way of saving it. In this case

the material may be hauled into the cellar and thrown on the excrements as they come down through the scuttle, or stored in the barn above, put under the stock for bedding and into the trench behind them. In this way with a plenty of absorbents, I don't know why all cannot be saved. In case a barn cellar cannot reasonably be had, a good tight shed over the tieup windows will do very well. In this case you want a deep water-tight trench behind the stock and keep it full of absorbents. In this way nearly, if not quite, all may be saved. Dried muck, loam, leaves, sawdust, sand, cut straw or meadow hay, make good absorbents, although the farmer can hardly afford to use hay or straw if he can get anything else, for it is worth too much to feed in connection with more concentrated foods. But no man can afford to use absorbents to save this liquid manure and then throw it out into the open air to be washed by the rains and melting snow, bleached by the sun and wind, the best part of it going off in the air or washed away and finally finding its way into the ocean and doing nobody any good. Such a practice seems to be so wasteful and ridiculous as not to need a word of caution from me. Still it is a lamentable fact that nearly if not quite one-half our farmers are practicing just this course to-day. What wonder that the cry of hard times, short crops, farming doesn't pay, comes up from so many farms! The only wonder is that the farmer doing business in such a slipshod manner is able to live at all; and the very fact that he does is the best evidence in the world that farming carried on as it should be is the best business in Maine to-day.

I wish to say one thing more on this part of my subject and that is, house all your stock within reach of your barn every night in the year. It will more than pay you in the extra dressing you will make, and many times in the comfort of your animals. Now, I leave the first part of my subject with the crops all fed out on the farm, the dressing both liquid and solid all nicely housed under the barn or in a good tight shed.

WHEN TO APPLY.

I want to say to you under the second head, "when to apply," let it remain right where it is until after haying by all means; the reasons for this are so many and so obvious that the practical farmer need only hear them to admit their correctness.

First, I will mention the matter of time. The farmer has from three to four months in which he can do it just as he wants to.

Second, His land at that time of year is usually in good hard condition to drive or haul a load over with ease from the barn and without injury to the soil.

Third. Manure applied in fall, having had the fall and winter rains and melting snows to dissolve it and mingle it with the soil, is in much better condition for plant food than that applied in spring. If there is not plenty of spring rain, spring applied manure does the plant but very little good.

Fourth, The team is in much better condition than in spring, and the weather is better for work.

Fifth, It is so much done, and as soon as the ground is in condition to work in spring you have nothing to do but put on your pulverizing harrow, mellow your soil, put on your corn planter or seed sower, and put in a dozen acres in half as many days; when if you had your dressing to haul out in spring with a team not in first class condition, over muddy roads and soft fields, cutting up your grass fields and poaching your ploughed land, it takes days and often weeks to get the land ready to plant, and very likely by the time you have that done, if not before, down comes a heavy rain and sets you back so as to seriously endanger the crop if it is not a failure altogether. So I want to urge it upon you to try and get one year's dressing ahead so you can apply it all in autumn. I know you will not regret it.

MANNER OF APPLYING.

The last point I wish to call your attention to is the manner of applying to the soil, and I presume there is more difference of opinion on this than any other subject pertaining to farming. If we could control the elements, or if we could foresee even what the weather was going to be, we could solve the problem much more readily. As we can do neither we want to apply our dressing in such a manner as will give us the greatest surety against loss whatever the weather may be. It is amusing although sometimes provoking to hear some of our agricultural writers descant to the farmers about the great waste of throwing their dressing out in the open air exposed to the elements, and very likely before they get through the article, if not, then in the next one, advise the farmers to haul out the dressing in winter as fast as made and spread on the snow or bare ground just as it happens. I had a little experience in that once; there were so many advocating it and proclaiming there

was no loss by evaporation I thought I would try it. So I broke up two acres late in the fall. On one part I spread dressing from the barn cellar intending to harrow it in, and spread another strip with the intention of letting it lay on top of furrow, but the ground froze that night so that it all laid on the furrow. Then in mid-winter I hauled out and spread another strip on snow about one and a half feet deep. On the remainder I spread in spring. The dressing was all alike and of like amount. There was no rain of any amount during winter or spring until past the middle of May. The snow all went off with the sun and wind. The dressing on the snow lay exposed to sun and wind as much as two months before the ground got in condition to work. When it did I worked it up in good shape with wheel harrow, sowed to mixed grain, wheat, oats and barley, and seeded down to grass. The rain came on about one week after I sowed it and it rained a large part of the time for eight days, thoroughly soaking both ground and dressing. As a result I got about the same amount of grain where the dressing was spread on the furrow and covered with snow all winter and where it was spread in spring; but where it was spread on snow there was not more than one-half the grain, and not nearly as much grass afterwards. Had it been an open winter as it frequently is along the sea-coast, ground bare a large part of the time, I probably should not have had as much where I spread in fall and let it lay on top of ground through the winter as where I spread in spring. Whether the loss was from evaporation matters not to me. I know that there was fully one-third of the plant food of the dressing that lay on the snow that never went into the soil. This satisfied me that dressing cannot lay exposed to sun and wind one day, even, without some loss. Of course the longer the time the greater the loss. There are a good many who advocate spreading on top to be washed down into the soil in liquid form in better shape, they say, for plant food than any other way it can be applied. I will admit if we could be sure of having a sufficient amount of rain immediately after the manure was spread to thoroughly leach it and wash it into the soil, it would be the best way it could go to the plant roots, but such is not often the case. It is liable to lie there weeks and sometimes months even, until one-half the goodness is lost before it gets down where it can do the plant any good. This washing dressing into the soil means more than most people are aware of. The average farmer after spreading his manure the best he can by hand—which means that the most of it will be in lumps from the

size of a hen's egg to a man's fist—and after having had an ordinary rain of ten or twelve hours' duration, would be very much surprised on going to the field and examining, to find those lumps only fairly wet, not a particle having leached from them into the soil. Then the sun comes out and dries it again the same as it was before, only with less plant food in it. A dry lump of manure is very much like a sponge, and it will hold very nearly its bulk of water, and of course nothing leaches out of it until it gets all it will hold. You see at once it takes a pretty heavy rain to leach dressing into the soil very much.

There is another class who say most plant roots come close to the top of the ground, consequently the best way to apply manure is to spread on top and harrow in from one to three inches. Very well, if you will show me any implement short of a plough that will cover all or nearly all the dressing from one to three inches, I say that is well enough; but I never have been able to find that implement. We have got to take things as we find them, not as we would like to have them. The truth is the manure is lighter than the soil and on stirring the soil, works up even after being covered rather than down.

But you say it is easy to find fault with others; what do you believe in? I will tell you. I would plough under on old ground every time and for all crops, because this means pretty evenly mixing from bottom to top of furrow. Old ground in proper condition to work does not turn bottom up but breaks off and falls into the furrow previously made. When you spread manure on the sod and turn it under, it puts all of it in the bottom of the furrow no matter how deep you plough. This I would not do unless you intend to plough the land again for it puts it down too deep for grain and grass roots. But for all hoed crops where the land is to be ploughed again I would plough under every time. A few years ago, I tried the different methods of manuring for corn. I took a piece of badly run-out grass land divided into four parts. On the first I spread manure on the grass and turned under about six inches deep. On the second part ploughed and spread the same amount of dressing on the furrow and harrowed in the best I could. This was done in fall. The other two parts I let remain until spring and then did the same. Then mellowed the soil thoroughly, marked off three feet apart each way, put about three hundred pounds phosphate to the acre in the hill and planted. It was a very wet season and there was not much

difference between spreading on grass and ploughing under, or on top and harrowing in. It was very much less work, however, where the dressing was ploughed under, no manure in the way in covering and not as many weeds. The fall working in both cases was better than the spring working. In the fall after my corn was off, I ploughed the ground about one inch deeper than I first ploughed turning the old rotten sod with the dressing to the surface, and the next spring sowed to grain and seeded down to grass. The grain and grass afterwards were very much better where I ploughed under the dressing. I have tried it several times since and if it is a dry season I get much better corn by ploughing under; if wet season not much difference.

I have tried the same with potatoes with the same results. The reasons for it are very obvious. A plant root never comes out of the ground to obtain nourishment, nor does it draw nourishment from dry manure; and when manure is spread on top some of it remains on top, and considerable more lies so near the surface that it is perfectly dry in dry weather. Now the fact I want to impress is this: You can't afford to take any chances on the weather, but should pursue that course that will insure success whether the season be wet or dry. I am met right here by the argument that corn is a shoal feeder, its roots running close to the surface; hence if you plough under your dressing they will not find it. I admit corn is a shoal feeder, and it is also a deep feeder. The main roots of corn run down directly into the soil as deep as it is made mellow, and from these main roots small fibrous roots penetrate every square inch of soil, from row to row and from hill to hill, so that wherever the dressing lies, providing it is under the soil and in a moist state, they will surely find it.

Quite a portion of our farm is too wet to cultivate in spring. This we turn over immediately after haying. Spread on about five cords manure to the acre, harrow in the best we can with a wheel harrow, which we consider the best, all things considered, of any thing we have yet found, and after we have got it smooth and level sow our grass seed and roll. This does not satisfy me, for when I walk over the ground I can see fully one third of the dressing lying on top of the ground and I know a large part of its value I lose; but it is the best I can do. It would not do to plough it under. The roots of the common grasses run so near the surface they would

not find it. I am waiting for some one to invent an implement that will cover it all up.

I have endeavored in this paper to give the result of my experience and observation. If there is anything in it worthy of consideration think it over, and if you can glean from it anything of value I shall be more than satisfied, for I believe we as farmers can be greatly benefited by the results of each others experience.

VEGETABLE GARDENING FOR MAINE.

By A. J. TOLMAN, Member for Knox County.

It is a well known fact, that the great West is so monopolizing grain growing as to make it a business no longer profitable for the small farmer to continue in. The great railroad lines stretching from one end of our country to the other forming a complete net work over the rich prairie lands of the West, bring wheat and corn to our very door at lower prices than we can afford to raise them for. And although this has been our experience for years, the reduction of freight rates, on account of competition between different lines, and the development of new lands makes it more certain that we must still buy our flour and corn and grow crops that will pay us better. Many of our Maine farmers have been induced by stories of the large yields and the productive qualities of prairie lands to pull up stakes, and emigrate. Some have been successful, while others have been dissatisfied and have sold their new homes and lands for the best price they could get, to return to the rocky hills of New England to engage in a system of farming they were more familiar with. And there is this fact about it, our markets are better. We get better prices and our fruit and vegetables if not better, are of as good quality as those grown in the South or West. We have other advantages—the West may have inducements for the foreign immigrant who, having abandoned friends and home, may as well settle in one place as another, for go where he will he will be sure to find none but strangers. But of our own people who go there very few of them acquire property by legitimate farming, even after sacrificing all the tender associations of relatives and friends whom they leave behind, and enduring hardships and trials of double severity with those they need encounter if they would consent to endure them on lands within a few miles of their birthplace. If

they become rich it is by risky speculations or by the rise and fall in the value of their lands. So far as real practical farming is concerned it will be found that our own climate is incomparably superior to the West for the owners of small farms and those with a small capital. Our society is better, our schools are of a higher grade, and the school season longer as a general thing. There are some other disadvantages we do not have. We have hard struggles some seasons with the insects to preserve the growing crops, until by the course of nature they outgrow their enemies. But we do not have clouds of grasshoppers put in an appearance and carry off our grain and corn in a single day, or a cyclone lift our buildings and locate them in another part of the town against our wishes, nor a rise in the river carrying our homes on to destruction and taking years of hard work and economy to replace them. These disasters are not not an everyday occurrence however, in any part of the country, although they are quite common.

Taking the ground that the great West is so monopolizing grain growing as to make it an unprofitable business for the small farmer, what can be done? We are constantly making changes in our farming operations, and with the beginning of the winter season when we have more time to read and think, we should devote some of our spare time to studying the cause of our failures in certain directions, find the remedy so that we may avoid a repetition and make the coming season more profitable if possible. If we can grow any crops the coming year that will pay us better than those we have raised the past season it should be done. If we are in the vicinity of a good-sized town that is not over-stocked with vegetables we can make the growing of them pay. Our city and town populations are using more and more of them every year, and there are plenty of men that are actually making more money from ten to twenty acres planted to garden crops, than other farmers close by them with from one to two hundred acres of land. Many of these men with but ten to fifteen acres are netting from $500 to $1,000 per year when they have a market that is any way favorable. Of course there are localities where this business is overdone, and even there if the right assortment is planted special attention being given to certain crops and having them properly grown, there is no difficulty in finding a market. Where there is one locality in which the business is overdone there are three where it is not. Every well-conducted farm should have a good-sized vegetable garden. In addition to the

regular work of the farm, it matters not at what specialty the farmer is engaged in, whether fruit growing, poultry or stock husbandry, he usually carries some vegetables to market every year, if no more than a few bushels of early peas or potatoes. So he becomes to a certain extent a market gardener. The establishment of canning factories throughout the State within the past few years, and the reputation of Maine canned goods in the market (of sweet corn in particular) has made a change in the work of many of our farms. Although they have not been a success financially in every case, we have learned how to grow the material for filling the cans, sweet corn, peas, squash, tomatoes, &c. Also have learned to know what the market demands, the most productive varieties and the best methods of cultivation. The market demands to-day if not a larger quantity a better quality of vegetables than it did fifty years ago. What could they have done with the immense quantities of asparagus, spinach, and celery, that are sold every year in our markets now. It is true the country is larger, yet the demand for vegetables has increased. There are also more people to grow them. The sales for plants used as salads are on the increase every season, lettuce, spinach and dandelions. It is surprising to see what quantities of them are sold every season. They are expensive, too, and yield a handsome sum to the grower.

A well fitted establishment for carrying on the business of market gardening is an expensive affair, and would pay only in the vicinity of the large cities where they keep them in operation the larger portion of the year. They have acres covered with glass cold frames, hot beds, and forcing houses fitted with heating apparatus and an abundance of water so that it can be taken to any part of the place. Many of them carry on the culture of flowers as a business of itself. This requires a thorough knowledge of practical floriculture and years of practical experience.

Now, then, if we are to make a start at vegetable growing, we must have a good sized hot bed. This is indispensable unless we are growing late crops for sale during the winter season. Our season's work commences with the formation of the hot bed. They are made up at any time after the first of January. But it is hard work and we have a great deal of cold weather until the middle of March, when there is time enough. Mine are not started until the 20th of March, very often as late as the first of April if the weather is stormy or cold. Then I am in the market as soon as any one—

with early cabbage the middle of July and tomatoes a month later. I will not attempt to give any directions for making up a hot bed. They are found in nearly every seed catalogue published in the country, which can be obtained by simply sending your address to the seedsmen. Although they are made up easily a great deal of care must be exercised in running them. An even temperature should be maintained, and after pleasant weather sets in the sashes should be opened through the middle of the day and closed before it gets too cool in the afternoon. It will not do to neglect them. Sometimes a delay of a few minutes in opening will ruin them by scorching. On the other hand they might be chilled by not closing in time at night. Cabbage and lettuce can be grown at a lower temperature than tomato or pepper plants, and should not be planted in the same frame. One thing must be borne in mind: the heat in an ordinary hot bed lasts only about six weeks, and the earlier in the season it is made up the deeper it should be built. Say two and one-half feet for March first, while a bed one and a half feet deep would answer the first of April. They can be built in any form or size, but the most convenient one is three by six feet the sash, and the frame any length. This is the size used by all gardeners.

A cold frame is very useful and plants can be forwarded two or three weeks in them. They are simply a good rich seed bed covered by a frame and glass. They are used for hardening off plants before they are planted in the open ground, and are valuable for this purpose. Every farmer should have a hot bed or at least a cold frame for his own use. Old window sash can be used, while some recommend the use of common unbleached muslin tacked on a frame and painted over with a coat or two of boiled linseed oil. This can be built much cheaper than a glass frame, is lighter, more easily handled and a very good substitute. A space three feet by six is not very large, yet the amount of plants you can grow in it is surprising. I use them first for growing early cabbage plants. These are set about two inches apart, each frame holding five hundred plants or more. The cabbage are large enough to set in open ground by the last of April, when the frame is filled with tomato plants. About six dozen of these can be grown under each sash and are ready to plant out by the last of May. The weather is pleasant and warm by this time and there is no further use for the hot bed.

When the cabbage plants are taken out and the tomato plants are set, cucumber seeds can be planted between them. There is plenty

of room as the tomato plants are five or six inches apart, and when these are taken out the cucumbers will have the whole space and will grow very rapidly and be two or three weeks earlier than those set in the open ground. This is quite an advantage and some profit if you are growing them for market. Thus you will see that the gardener must grow his own plants. It will pay him to do so as early cabbage plants are worth by the wholesale nine dollars per one thousand and tomato plants forty cents per dozen. As the season advances the price drops of course.

What I mean by early plants is cabbage ready to set by the 28th of April and tomato plants by the 20th of May in an ordinary season. I cannot in this paper give advice or directions for growing the long list of vegetables that is offered for sale in our markets, as many of them, to go into the subject thoroughly, and discuss soil, varieties and other details would occupy the whole time. I will only speak of those I have experimented with and which have proved successful and profitable and best suited for our Maine markets.

Asparagus is one of the most wholesome and delicious of all vegetables. It is the first of garden crops to go to market. It comes so early in the spring that nothing competes with it except southern produce, and its culture and popularity are yearly increasing. It is easily transported and bears carriage so well, that it can be grown a long distance from the market. It thrives on a deep sandy loam. It should not be planted on stony land as the stones will obstruct the tender sprouts and make them grow crooked, and will also interfere with the knife in cutting. It can be grown from the seed, but as it is not ready for cutting until the third or fourth year I would advise one to purchase plants about two years old, set them in trenches three and a half feet apart made rich with a liberal application of manure and a sprinkling of salt. This can be done either in the spring or fall with equal success. I prefer the fall as there is more time, for in spring there is plenty of other work to attend to. The marketing of asparagus needs a great deal of care. It should be cut every day and tied up directly in bunches about 8 or 9 inches in length, a common bushel box holding three dozen bunches. Conovers' Colossal is considered the best variety and more of that is planted, than all other kinds put together. The sale of asparagus is limited in time, but there is a good demand for it while it lasts. It will pay from $150 to $200 per acre, and is a good crop to raise. It is easily taken care of, and sold and out of the way by the last of June.

I suppose all can raise green peas and all know how to plant and cultivate them. They are a crop that is grown largely for market in every state in the Union. They are sown throughout the summer months as late as July. But the first sowings everywhere always give the best results. Peas are a better crop for the farmer than the gardener. Some seasons they are quite profitable, but as a general thing, in our small markets they come into competition with the later peas from Massachusetts, the price goes down, and there is no sale for them. The canning factories use a great many of them however, and this makes a good outlet for the surplus. I have found late peas a paying crop the past two or three years by planting the Champion of England, the best without doubt, quite early in the season and shipping them to Boston about the first of August. Their native peas are all gone at that time. I have received as high as $4 50 per barrel. Last year they netted $3.50 to $3.75 which is a pretty good business, much better than the early ones did and a sharp demand for them too. The best method for growing early peas is to plant every third row to squashes. The peas are off by the middle of July, and you thus get two crops. For an early pea the American Wonder is as good as anything.

Potatoes planted early are usually a paying crop. It is always best to plant them about as soon as the ground can be worked. This has been pretty well demonstrated in our county this season. The late ones were an entire failure, and those who sold off a few bushels of early potatoes made a little money that they would have lost by leaving them in the ground a few days longer. Mine were planted this year on superphosphate alone, and while my neighbors found theirs not worth digging, where they had planted on stable manure, I got about half a crop. Quite a number of bushels were sold the second week in July, and if I had dug them all then I would have had over two hundred bushels to the acre. I planted Clark's No. 1, the Early Maine and Early Rose, and the Clark's gave much the best yield.

After marketing the potatoes we commence to cut some of the cabbage. The early varieties of cabbage are cultivated more largely than any crop grown. If they do not occupy a larger number of acres, they bring as good a price as any other crop. If you have land that is in good condition, and a supply of fine manure there are few if any crops which can be put on such lands that are capable of bringing as much ready money for the labor and expense

as a good crop of early cabbage. The cabbage plant is a large feeder and if the soil is not already rich it must be heavily manured. However, good fresh corn or potato land which has vegetable matter enough in its composition to make it loose and work easily will produce better results than a heavy soil which has been several years under the plow. It is very important to secure good seed. There is much poor seed in the market grown on poor loose heads or stumps on which no head has ever been. From nothing comes nothing, and like produces like, is an old adage. Planting this kind of seed the result is a mass of leaves with a very small per cent of good cabbage. The seeds are planted as soon as the first of April if not before and the first thing after the hot bed is under way. They should be transplanted twice before they are set in the open ground. Transplanting builds up the roots and makes them more stocky and stronger. A great many use cold frame plants, plants which were grown in the fall and wintered over. It is claimed that they are more hardy and better than those started in hot beds. I have tried them and find they are no earlier, and so see no advantage in using them. The cabbage has many destructive enemies. The club root or stump foot has been the only one that troubles me, and this is found more on the late plants. It is a bad disease and there seems to be no remedy for it, unless it is to set them on land that has not grown cabbage or turnips for two or three years. Even there we cannot escape it. This year my late plants were set on a piece of land that had been in grass for years. The roots of the young plants were washed thoroughly before setting, yet a large portion of the piece was stump footed. On the other hand. they have been planted on the same land for years in some localities with no appearance of club root. Good authorities have advanced the theory that the little white maggots which are found in plant beds and which eat the fibrous roots off are the larvæ of the striped flea beetle, and to escape the maggots the flea must first be kept off. Ashes or salt is good, or a light sprinkling of Paris green. The best varieties for early sale are the Jersey Wakefield, followed by Henderson's Early Summer and Fotler's Brunswick.

The culture of late cabbage differs but slightly from the course pursued for the early ones. The plants are raised by sowing the seed in the open ground and setting them out from the middle of June until the first of July. The rows should be about three and a half feet apart with stable manure spread broadcast, and a handfull

of superphosphate where each plant is to be set. Do not wait for rain, that is the old fashioned plan. The best gardeners transplant whenever the ground is in good condition. The plants should be watered and if a rain comes the watering will do no harm. They should be hoed within a week and the ground constantly stirred with the horse cultivator throughout the season. Salt should be scattered among the plants at the rate of a barrel to the acre. Unleached ashes and lime are beneficial, not only as fertilizers, but they keep many insects away that might injure the crop. The late cabbages are more plenty than the early ones. They are raised more easily and, consequently, sell for a lower price. They are worth at present $1 per 100 lbs. while the early sorts brought double that price. I plant the Fotler's Brunswick for a late cabbage and like it as well as anything. It has but few outside leaves, a large solid head and is a heavy cropper. The Stone Mason and Flat Dutch are better keepers. But I intend to have them sold or made up into sauer kraut before the first of January. The Winnigstadt is a good cabbage for early or late, and forms a good solid head. This sort can be planted at the rate of 8,000 to the acre; Flat Dutch and Stone Mason about 6,000. Cabbages intended for winter use should be left out until quite cold weather. Then pulled, stood on their heads to drain, then stood on their roots on the bottom of a cool cellar, where they will keep until spring.

The tomato is one of the most important of all garden products. There is probably no vegetable that possesses nutritive properties in so great a degree and which enters so largely in the list of vegetable food as the tomato. Hundreds of acres of them are planted every year in the vicinity of the larger cities. After procuring the plants the least experienced can grow them without trouble. They can be grown in any common garden soil, but perfection is attained only under the highest state of cultivation. To produce early crops the seeds must be planted in the hot bed by the first of April so that the plants will be large enough to set out by the last of May. I usually sow my cabbage and tomato seed at the same time. The tomatoes are slower about starting, and the cabbage plants are up and transplanted before the tomatoes have formed their center leaves. They should be transplanted twice at least, giving them more room each time, and plenty of light and heat. Without doubt a light sandy soil is the best, though I have had good crops of them on clay. They should be planted six feet apart each way,

and if the ground has been enriched enough they will cover it before the end of the season. At this distance 1200 plants will set an acre. Some growers make a practice of cutting off the leading shoot of the plant, and practice trimming them all through the season, thinking by this means to get an earlier and larger crop. Others tie up the plant to stakes, or build a trellis, but my experience shows that no benefit is derived from either practice. An average yield is about 400 bushels per acre, and like all vegetables grown on so large a scale the price varies. The first early ones go to market about the 25th of August and bring two dollars per bushel. As they grow more plenty they keep dropping in price until the last ones are sold for twenty-five cents. The factories pay from 25 to 35 cents and large quantities are sold as low as 20 cents and delivered—barely enough to pay for the labor of gathering and transporting them. Large quantities are sold for making pickles and chow chow. They are used green for this purpose and bring from 50 to 75 cents per bushel. The market calls for a large smooth tomato. In earliness there is no perceptible difference, and while the bulk of my crop is planted to the Acme, which I consider the best, I grow largely of the Paragon and Livingston's Perfection, all of them smooth and of good size.

Onion growing is one of the leading branches of market gardening and quite remunerative when well understood. They are not a difficult crop to raise. They are no more perishable than potatoes, and they do not require immediate marketing when harvested. Instead the grower can await a favorable opportunity in the market, if he is not satisfied with fall prices. In large markets an entire crop can be disposed of any day to shippers and dealers, as onions have their market value as firmly established as corn or potatoes. While quotations may vary somewhat from day to day a farmer can generally tell by them what he can get for his crop. Grown from seed they are cultivated almost exclusively by farmers or men who make a specialty of this crop. Thus grown they are all sold in the dry state, and form an important article of commerce. It is a crop that requires heavy manuring; they are strong feeders and a second and very liberal top dressing of fine manure, phosphate and ashes, when the crop is half grown and the available plant food in the soil is nearly exhausted, is a practice which always pays well. As soon as most of the tops are getting dry, the crop must be pulled without delay, and left on the ground for a time to cure. Then sort them over

and sell as soon as you can find a market. As a rule it does not pay to keep them over until spring, even if prices should be higher then. They can be kept with safety in boxes or barrels in a dry cellar, avoiding frequent freezing and thawing. The distance apart between the rows varies among different cultivators from six to twenty inches. A medium distance of about fourteen inches is preferable, giving ample room for cultivation and the growth of the roots. Clean cultivation is absolutely necessary, as the growth of the onion is greatly retarded by the presence of an unnecessary growth of weeds. Of the many varieties in cultivation each individual must decide for himself. The Early Cracker is one of the safest and best for a beginner. While many prefer the Westerfield Large Red for its size and surety of a fair crop, I have had the best success with the Yellow Danvers and Large Red Globe. The former sells the best in the market, and is usually found there to the exclusion of all others. They should be sowed the first thing in the early spring as soon as the ground can be harrowed over, having been ploughed the previous fall and covered with a liberal coat of manure. About five pounds of seed are required to an acre, but as there are some places to be planted over where the seed failed to come, it would be better to reckon on six pounds. The past has been a poor season for the onion crop all over the country, and they are worth to-day from $3.75 to $4.00 per barrel.

The raising of cucumbers for pickles is a good business for the farm gardener, and those who have land suitable will find them profitable. The growing of them in the open ground is attended with a great deal of annoyance and loss occasioned by the attacks of the striped bug. Repeated sowings are often entirely destroyed by them. For the past four years I have covered each hill with a box about sixteen inches square, seven inches high, and covered with wire cloth as is used for screen doors, and find it effective in keeping them out. My squash hills are covered in the same way, and as far as the boxes go I have no trouble. The remainder of the hills I sprinkle every other morning with a light dose of Paris green, which is about as reliable as any remedy I can find. Cucumbers are extensively grown for pickling. Large factories are engaged in putting them up in barrels, half barrels or bottles, to suit the demands of the retailer, and immense quantities of them are shipped to foreign ports. It is a growing industry and a profitable one if rightly managed. They are grown in hills four feet apart

each way. A light porous soil is the best but they will do fairly well on any soil suitable for corn. The soil is of less importance than the culture given. Thorough culture, deep and fine, together with good manuring are the essentials. Care should be exercised in gathering the crop. They should be gathered every other morning to prevent their growing too large in size, as the smallest pickles bring the most money. A sharp knife is needed to cut the cucumber from the vine. A half inch of stem should be left on each pickle. They are then washed and packed away in barrels in a salt brine strong enough to bear up an egg. This is the rule, but I find that the coarser ones need more salt. Do not use barrels with iron hoops, as the salt eats through, causing them to rust off. The cucumbers are graded as fines, coarse, mediums and large, and are sold at so much per hundred according to size. All defective and bad shaped should be thrown out as they injure the sale of the rest. The White Spine is in my opinion the best variety both for forcing under glass or growing for pickles in the open field. It is free from the bitter taste so objectionable in some sorts and grows of good size and shape.

The culture of celery is becoming more common each year. Formerly it was thought that celery must be planted in trenches, and this expensive method was followed for a long time, but now our market gardeners set the plants among the rows of early cabbage or other crops, and when the first crop has been taken out they commence earthing up the celery. It is a hardy plant and will stand a low temperature. It can be left out very late in the fall and most of the work to bring it into the proper condition can be done after nearly all other crops have been marketed. It is valuable for its medicinal qualities, more particularly nervousness and diseases of the kidneys, and for this reason is coming more largely into use each year. Its culture is simple, and good bunches can be sold in the market at any time. The Boston Market is one of the best known sorts while the Golden Dwarf and White Plume are both excellent varieties.

There are many other vegetables that I would like to speak of, among them the cauliflower, a most delicious food for the table, much better than the cabbage ; and peppers also, of which a limited amount can be sold. These I use mostly in making mixed pickles, although a great many of them are sold from the field. The crops I have spoken of are not those grown exclusively by market gardeners, and many of you are as familiar with their culture as I am. There is a long list of vegetables, beets, turnips, beans, green corn,

squash, sage, rheubarb, horse radish, carrots, parsnips and so on. Many of these are the products of the farm rather than the garden. Lettuce and cucumbers under glass I am somewhat familiar with. These are the products of the professional rather than the out door gardener. I have endeavored to call your attention to those crops which might pay in your vicinity and which are brought to your market and sold there by other parties. Can you not grow them yourself at a profit? Think it over.

Few people who have not "been raised to the business" appreciate the amount of knowledge and systematic labor required to succeed at market gardening. Success is only attained by the constant application of untiring energy and close attention to business. We cannot simply plough the ground and plant the seed, and expect to reap an annual profit. One of the principal parts of the business is the selling One must be in the market every day and keep his customers supplied. This is important. If you neglect them they will patronize your rival, which is not pleasant. Study the needs of your home market, and in a year or two your own experience will be of more value to you than any advice given by another.

THE NECESSITIES OF TO-DAY.

By Dr. G. M. Twitchell.

To be fully alive to our responsibilities and prepared for the work of to-day, we must realize one fact, that the radical change in our surroundings and conditions both as relates to ourselves and the world at large, necessitates an equally radical change in our thoughts and methods, and forces us to view the subject under consideration from a different standpoint from that occupied by our ancestors. We live in the midst of a world bustling with its activities.

The desire for wealth is driving us over the road at break-neck speed, and there seems no time for careful, mature deliberation. Self-pride points to immediate action and we join the throng, looking sharply to the right and left that nothing be neglected which would aid us in our struggle. The wonderful inventions born of the very necessities we are to consider force us at still more rapid strides along the highway of life.

We cannot farm as our fathers did. The door of their methods is closed by the pressure of the new life upon us. Think for a moment of a man and wife set down in your midst to begin life's labors with only the implements of fifty years ago at their command! To be a successful farmer to-day one needs to be fully abreast the best thought of the times. I doubt if ever there was a time when *anybody* could make a farmer. That idea has been far too prevalent, and as a natural sequence we see deserted hearthstones, ruined lives and broken families. To-day no profession is more exacting, none requires more thorough fitness. The young man who would succeed on the farm must have, first of all, the foundation of a good education. Having this the super-structure may be built in later years.

This much is necessary because of the attention needed to be given to the laws of breeding, and the establishment of tendencies as fixed characteristics—to the question of chemical affinities and action: the relation of different soils to the several crops—that one may be prepared to think quickly and intelligently.

There is no occupation giving more scope for intelligent research than that holden by the farmer. In all this range of study the one thought of practical results must never be lost sight of.

The commerce of the nations necessitates the introduction of new methods everywhere. The opening markets of the world, not only give fresh avenues of trade, but put us into narrower limits through increased competition. Thus the margin of profits has been gradually growing less. No matter what our crop, we find the products of other nations side by side with ours in the markets, and often reducing our profit to the minimum.

With the blessing of extended commerce there comes, not the curse, but the necessity for the application of better methods, that two blades of grass may be made to grow where now there is but one. Thus farmers are being forced to do the best work of which they are capable, and doing this, agriculture becomes a science of the age. The farms of the future must yield larger and better crops, the cows give more milk, and that which will produce a larger per cent of cream, our stock must make more rapid growth, and make better beef, pork, mutton and poultry at maturity. Our motto must be, *the maximum of growth at the minimum of cost.* This is the necessity which stares the farmer in the face to-day. To realize these there must be strict attention paid to feeding. We want to know

what is the right ration for the land or the stock, in order that the elements be provided in right proportion and nothing be lost. There is no field for hap-hazard farming in the future. Systematic work must be resorted to, and this calls for close application and careful study. No man can map out the work for another. Individual cases require individual treatment. All that can be done is to suggest general principles.

Upon the right appreciation of the necessity just hinted at the whole question hinges. Not only has the time passed for the farmer to follow blindly as he tills the soil, but it is also necessary that he be alive to the duties and responsibilities of citizenship. Turn which way we may and we find public trusts are being conferred on members of the legal profession. Young men crowd the gates leading to the practice of law, not because of personal fitness, but rather because *there* is the avenue to political preferment. The responsibility for this unsavory condition may, in a large degree, be charged to the farmers, who have drifted rather than acted, and thus become servants rather than masters. This is not a question of parties. That is an individual matter to be settled by your own individual conscience. No speaker standing in a position like this has any right to urge partisan questions, but there are issues that transcend party lines. I would urge that, regardless of party, you act for yourselves and your own best interests. The dangers that threaten are to be traced to a neglect of our duties and responsibilities. There are vital questions in the political arena everywhere, and the highest intelligence is necessary for their right solution. Upon their solution rests the future prosperity of the nation. Agriculture has its rights and should be respected. It is the bed rock of our prosperity. While others may gather their wealth about them and depart, farmers are tied to their acres and forced to face the gale. Only in the intelligent thought and action of the people can we be secure. Why cannot and should not farmers combine for their own advancement? Can you produce any valid reason why this should not be done? Does not every right consideration point to this? Whenever farmers have united legislation has followed favorable to this great army of producers. There is no call for us to go outside our own State for proof of this position. Note the struggles of the State College for a bare existence, the opposition it encountered from farmers, led by designing men in other callings, and the grand work it is doing in spite of these. Hardly a student has gone out from the agricultural,

chemical or scientific departments, but has been seized upon at once as teacher or instructor in similar institutions elsewhere, while the character of other graduates will compare favorably with the standard of other colleges. Within ten years, if the good work is allowed to go on, not one man can be found who will dare acknowledge he ever cast his vote against this institution. You cannot count the blessings that come by and through the work done there, for the one aim has been to help the farmers to help themselves.

The duties of citizenship require that farmers combine to check the evils that exist. Farm products must reach the markets as cheaply as any others. There must come an end to unjust discrimination whether it be in transportation, commissions, duties or taxes The neccessities of to-day should force us to a unity of action that will check the evils that exist, and prove to the world that we who are governed are able to govern ourselves. While there is need of a higher intelligence and more united effort on the part of farmers, there are other fields calling for attention. If by any means better crops can be secured, and put on the market at a cost to the producer in proportion to the price received, the burdens of the farm will be lifted. Through the introduction of so many forms of labor saving machinery, hand labor has been materially reduced. The hand hoe still has its place but it is to supplement the work done by horse power. The fields that cannot be cultivated with a horse hoe are a source of loss to-day to any man. Machine work with its exactness and perfection enables the farmer to do more and better work than can be done by hand. He must use those implements which will enable him to do his work in the best and quickest manner if he would gain more than a bare subsistence. We must avoid the preventable losses. Our fields are being sapped of their vitality. The available plant-food is being exhausted, and we are forced to provide in every way possible all the necessary elements, only to find our work hindered because of imperfect supply.

How about the weeds and shrubs growing by the fences, and the shade trees scattered through the fields, all drawing heavily from the earth's supply and giving nothing in return? These elms so beautiful may furnish shade from the heat, and the shrubs and vines a few berries and some fruit, but they are a dead weight to the farm. There can be no room for the useless in the farming of the future, for the margin between profit and loss will not admit even a slight variation.

The extensive prairies of the West are at our doors, competing with us in our home markets with their beef, pork, grain, mutton and poultry. The great question for us to consider is, how to meet these immense producers on their own ground, and hold the advantage that is ours by reason of location. We have not the broad expanse of field or pasture, but in their methods may find help for the good old State of Maine can produce more to the acre than any western prairie. The study with the West has been, and is, to produce every bushel at the lowest possible cost. Every item is weighed in the balance, and if it will not pay it is discarded. A well-known corn grower of Kansas told me one day that he found the difference between profit and loss in the length of his rows. The loss of time in plowing, planting, hoeing and harvesting, was reduced to the minimum, and profit resulted.

I once asked a successful farmer in Maine how he made farming pay and he answered, "by having all my plowed ground in one piece." This man was avoiding a preventable loss. Fifty per cent of the losses at sea are said to be preventable. How is it on the farms? Here we find one of the necessities we are considering.

Another preventable loss is that of imperfectly tilled fields and crops. Our Experiment Station in its advanced work is doing what the individual could not do, and we have only to adapt our farm work to the line of operations here marked out in order to reap satisfactory returns. We know that to preserve the fertility of the farms, we must regularly supply the food elements in proportion to the amount removed by crops. Doing this there can be no exhaustion of the soil. The fresh fields of Aroostook or prairies of the West will for a time yield bountiful harvests because these elements are in the soil, and available for crops, but throughout the older farming sections they have been carried off until now we suffer. We raise our crops, feed to the cattle, horses, sheep, swine and poultry, and if we but utilize the solids and liquids, have in the voidings that accumulate the food necessary for successive crops. Right here is a preventable loss that no man wants charged to his account. On more than half the farms in Maine the natural means of fertilization is allowed to waste three fourths their value by carelessness. Thousands upon thousands of dollars went out of Maine last year for nitrogen, phosphoric acid and potash; and thousands upon thousands more went out of the manure piles and down the drains through exposure and neglect. This double drain no farmer

can meet. It is so utterly at variance with all business methods that no prophetic eye is necessary to foretell the result. The element of cost is more than doubled and it is not strange that the cry of "*no profit*," goes up from so many farms. The necessities of to-day force upon our attention the need of business principles in carrying on farm work. Introducing these the last great leak would be stopped and better conditions follow. Nature holds us to a strict account in all our transactions, giving of her bounty only in proportion as we through intelligence give of our skill and labor. If we bestow she will not withhold.

One business firm in Maine sold in the State last year 100,000 barrels of flour, almost ten million bushels of corn, three hundred carloads of shorts, and thirty-five of grass-seed. Here are some appalling figures to contemplate! This firm is but one among many. It may be one of the largest, but the figures here given may be multiplied many times before the limit of our consumption is reached. If these goods represented the demands of the cities it would be an encouraging feature, but from Aroostook to York, from the northern boundary to the sea, the farmers stand crying, "Give, give, O, West, of your grain and farm products or we perish."

Why are we so dependent for the very products of our farms? Why are we not producing sufficient to meet the demands of our own stock. In very shame this cry of hard times should cease until we have learned to utilize all the wastes, and produce all that is possible. The margin of profit may be small but the farm that is self-sustaining by the use of the agents produced upon it can know no loss, but be a constant source of revenue to its owner.

Mr. Edward Atkinson says "where we now support fifty million souls, we might by the proper cultivation of the same acres, bringing the products up to the average standard of reasonably good agriculture, sustain one hundred millions." We have one million five hundred thousand square miles of cultivated land, capable of feeding a population of nine hundred million souls, and in addition sending out annually for exportation five billion one hundred million bushels of grain. Our agriculture rightly improved can sustain one thousand million souls. Have we not the right to claim agriculture as the basis of our prosperity, and should it not teach us the lesson of better application? "America holds the future destinies of the nations in her lap."

Another necessity laid upon us is that of the broader and truer education of the young. We look to the coming generation for the farmers, merchants, business men, philanthropists and statesmen of to-morrow. Reforms always lie hidden in the future, waiting the coming of the fresh, warm blood of the nation. We cannot break the bonds that hold the middle aged man of to-day, but we may mould the thought of the young so that a higher level may be reached in years to come.

It may seem heresy to put a thought into the mind of a child ahead or above its parents, but the habits controlling them must not fasten upon the children. They must be free to think and act; to make the most possible of their own lives even though they run in altogether different channels from the paths trod by their fathers. I would stimulate the boys and girls of to-day to be better boys and girls than their fathers and mothers before them because of their grander opportunities. I would urge to a nobler education which is theirs to have so freely, where their parents toiled so hard. I would impress the value of business knowledge to meet the competition of which their elders never dreamed. All this I would crowd home upon your thoughts as one of the necessities of to-day.

The avenues of trade, the professional walks and the farmers' mart, are crowded as never before with a mass of humanity eager for a slight advantage. While there is always room at the top, the ladder stands upright and never leans to catch the laggard. No man can live by and to himself. The very air is stirred by the perpetual motion of those about him. Hardly an element but is made to do the bidding of men who with one thought labor until the goal is reached. I care not what a man's occupation, so long as *a man* stands in the place. Against this idea of a genteel occupation every honest man should set his face. Not what a man does but what he is, in his thought, his life, his acts, tells the story. The laborer by the roadside, if he be an honest man, may look a king squarely in the face, feeling that he *is* a man for "a' that and a' that". It is this spirit of independence that the youth of to-day need to carry them straight forward to success. Our farms are waiting their coming with their fresh thoughts and high ideals to turn the drifting mass into channels that lead to better results. No emergency ever yet arose but the man and the means were forthcoming; no condition known but out of the demand came the answer.

The farmers have been drifting apart these many years. There has been wanting some bond of union around which they could gather and together work for better homes and farms. Recognizing the necessity for more intensive farming, better application and a more complete education, there has gone out from the hills and valleys of Maine a call that must be heeded. Out of this necessity came the grange, the farmers' opportunity, the one organization of all where men and women, old and young, stand equal together bound by common ties, working together for a common purpose. It follows and supplements all other efforts and in lifting the life of the farm and home is doing a service which can never be fully measured. It has grown from infancy to full maturity and is to-day the great social and educational work in the agricultural sections of the State. Around one common altar the whole family gathers regularly for social and intellectual improvement. The farmer to succeed must have mental training beyond the growing of crops. The labors are exacting but either the farm or the man must be master of the situation. If the farm, then the man is lost, and we find a slave. If the man directs, we have in the farm a willing servant yielding of her bounty. The grange helps to this end. By means of its co-operative work, purchasing and selling power is increased, and farmers as a class are beginning to see the benefits of co-operation. "In union there is strength" and to-day the farmer can find no other field open to him where so much may be gained as through the door of the grange.

Another necessity falls upon us and it must receive attention. While there has been an earnest seeking for labor saving machines to lighten the burdens on the farm, we should not forget the obligations resting upon us to lift the burdens in the house. The patient, uncomplaining worker there, who toils early and late, performs a round of duties of which no man dreams, and does as much toward the accumulation of property as the man at the helm, must not be overlooked. There is something in this world beyond getting money. Health and happiness, home comforts and a long life are the true essentials. The homes need be made bright and sunny to lighten the cares. Let us then bring onto the farms and into the homes—rather let us bring into the homes and then onto the farms—all the labor saving machines possible, knowing that the end will be peace and happiness to all.

Young men, have you thought of leaving the old home and the good old State of Maine? Wait! Whither would you go? Where find the home free from all care? Do you dream of the far West with its rolling prairies and sunny slopes? Remember this: there is no condition in life that has not its drawbacks, none without its compensations. If you will study these well and strike the balance fairly, you will find that it is effort and perseverance and intelligence and application that tell the story rather than location.

The same energy, the same prudence and self denial, the same amount of hard labor, will give as good results on these fertile farms in Maine as on any western ranch or sunny slope. The shifting, restless habit the young man forms who floats about unsettles him for all steady employment anywhere. Against all the attractions of the West we place the homes of New England. This rugged, bracing climate develops true manhood. These farms yield a rich harvest where men co-operate with them. Count your blessings and privileges as worth something and let them have just weight in the balance. I tell you, young friends, when you cut free from the old homestead with all its hallowing and redeeming influences you throw yourself upon a world that is cold and cheerless. Here are friends, here are the opportunities, here are father and mother. If you are true to the teachings of your mother, stout hearts are ready to aid you in any honorable occupation. The next decade will witness marked changes in the State of Maine. Already the current setting so strongly toward the West is being checked as men awake to the possibilities of New England. Our wonderful water privileges will be opened and improved. Railroads that are now building or to be built, will open new sections, develop fresh industries and bring our produce into closer proximity with the great markets, and the State as a whole feel a grand thrill of new life, if you will do the work that lies nearest you and do it well.

The necessities of to-day force us to action. You cannot be idle and be a man or a woman. The opportunities are yours. The advantages are yours. The whirling, busy world about you speeds you on. Seize the opportunity nearest, and make the best of it. Do the grandest work of which you are capable. Take your place in society here at home, and be counted for truth, for right, for honest labor, and the blessings that follow a noble life will be yours.

CLOVER IN AGRICULTURE.

By Prof. W. H. JORDAN, Director of State College Experiment Station.

Clover has occupied a prominent place in agricultural discussions and theories, and in crop production for many years. It has been considered the keystone to profitable farming in some parts of the country, being regarded as a means of bringing fertility to the soil, as a renovator of worn-out farms, and as the main stay of cereal crops. A common remark among Pennsylvania farmers is significant, viz: "when clover fails, we can't raise wheat any more."

As a fodder plant it is prized both as a soiling crop and when cured as hay. Because of the numerous relations of clover to the fertility of the farm and to stock feeding, much study has been given to it botanically, chemically, and in practice. The object of this paper is to bring together the best and most reliable of the theories and facts which have been recorded in regard to this useful plant.

HISTORICAL FACTS.

English farmers gave no attention to clover till the year 1635 when two or three books on farming called attention to the clover plant.

Farmers imported seed and in ten years cultivation had extended even to Ireland and by 1700 had extended over the whole kingdom and had a very marked as well as favorable effect upon husbandry.

Little attention was paid to the clover plant in the United States, till Dr. Franklin's time. He called attention to the effect of gypsum on this plant. This experiment of the Doctor's, and his description of it made the subject of clover growing very prominent.

In 1797, clover was spoken of by Samuel Deane, Vice President of Bowdoin College as a valuable plant in New England at that time. From that date the growing of clover increased rapidly in New England, New York and Virginia, so that in twenty years its cultivation had become general. Clover has figured as a fertilizer, as a cattle food, and as hog food both dried and soaked, and also as pasture. It also has served as a human food, the Digger Indians sometimes eating it now. Clover has been the subject of some curious legends and superstitions. A bunch of white clover is worn by the Irish as the Shamrock, (Gould.) Clover was formerly consid-

ered as noisome to witches, and the leaf was worn as a potent charm against their power. A four leafed clover means good luck when found, and the maiden who stumbles upon one of these leaves puts it over the door and then does her best to get the young man to walk under it. Its hollow stem, containing air, was supposed to give rise to hoven in cattle, because so often cattle eating green clover have this trouble.

THE ORDER OR FAMILY.

Clovers belong to the immense family of plants known as the Leguminosæ or Pulse family. Gould states that it contains over 4,000 species, which are distributed through every part of the world.

This family is divided into three sub-orders, and it is in the sub-order Papilionaceæ that we find the clovers. This sub-order is universally distributed, while the others are confined to tropical and the warmer temperate regions. This order contains many useful plants and furnishes many useful products.

Fodders, clovers, lucerne, alfalfa, etc.

Foods, peas, beans, pulp from carob-tree.

Medicines, Licorice, pulp Tamarind, Gums, Dragons blood, tannin, catechu, senna and cowitch.

Coloring Matters, Brazil-wood, Logwood, Red sandal-wood, indigo, Resins and Balsams, Copal, Balsam of Copaiva, Balsam of Peru, Balsam of Tolu.

Gums, Gum Tragacanth, Gum Arabic, Gum Senegal.

Industrial value, Tannir, Locust for timber and Rosewood.

Ornamental, many species.

The sub-order Papilionaceæ is divided into thirty-two genera, and clovers, belong to the genus Trifolium, which translated means *three leaves*.

Dr. Gray gives nine species of clovers as now growing east of the Mississippi river and north of North Carolina and Tennessee to which should be added Alsike clover. Dr. Vasey, botanist to the United States Department of Agriculture, states that there are in the United States forty species of native clovers, the larger number of which belong to the Pacific side of the continent. None of our native clovers have been cultivated. All those species we regard as valuable in New England are introduced. The following is a list of the species growing in New England of which mention is made as having value either present or probable.

Trifolium repens, white clover, introduced into New England, probably native farther north.

Trifolium hybridum, Alsike clover, introduced from Europe.

Trifolium avense, Rabbit's foot or Stone clover, nat. from Europe.

Trifolium medium, Zig-zag clover, introduced from Europe.

Trifolium agrarium, Yellow or Hop clover, nat. from Europe.

Trifolium procumbeus, Low Hop clover, nat. from Europe.

We have in New England no native species, though by some, white clover is said to be so.

Description of Species. Trifolium pratense.

Red Clover. This is the species in most universal use in New England of any, though the white may be as generally distributed. This plant is called biennial, that is, it must be replaced by seed every two years. There is a truly perennial variety (says Gould), Trifolium pratense-perenne, which has a super bluish-green color, narrower leaves, growth more straggling and a fibrous root, while the biennial form has a fusi-form (spindle shaped) root.

Trifolium pratense runs into varieties according to soil and climate, as for instance we have English, Dutch, French and American clovers. In general our American red clover is more inclined to be perennial than the foreign. We hear red clover spoken of as southern pea-vine, &c., and undoubtedly there are several American varieties, produced by cultivation under different conditions of soil and climate. Prof. Buckman, in writing for Journal of Royal Agricultural Society in 1866, states that in a field of red clover, Trifolium pratense, the following (six) forms, more or less distinct, can be seen. The names are given as found in this article.

Broad leaved clover,
Pale flowered clover,
White clover,
Pale perennial clover,
White perennial.

Gould states that he has observed great differences in length of stalk, and in the number of stalks from one root. There are not generally more than three or four stalks from one root, their usual length being from 1½ to 2½ feet with from five to ten branches. Gould states that he has often seen stalks six or seven feet long, and once in Cayuga county, N. Y., he saw a stem nine feet long, having 33 branches. In Aroostook county he saw a root which had seventy-two stems from three to four and one-half feet long.

Red clover certainly often grows very large and coarse, making a fodder of which there is a great deal of waste.

The root of red clover is generally spindle shaped, and constitutes a large part of the plant as compared with other agricultural plants. It penetrates to great depth, this varying with the kind of soil.

Two crops of hay may often be obtained from red clover the same season, and in localities with a long summer, three crops can be secured if the first is cut early. Red clover is fertilized wholly by the aid of insects; without insects no seeds would form. Bees are important in this connection, as in their search for honey they distribute the pollen. Unfortunately tame bees cannot feed on this plant, only the bumble-bee being able to do this. Trifolium pratense blooms during only a short period, the heads nearly all coming to maturity at about the same time. The period of bloom is somewhat earlier than that of timothy.

After bloom the leaves of red clover die rapidly, and, in fact, before and during bloom the lower leaves of the plant die and fall off.

Alsike Clover. This is a perennial plant, less widely cultivated than red clover, but gaining in favor. The plant grows less than two feet in length, has a small, rather weak stalk, so that when grown alone it does not stand up well. It matures later than red clover. The foliage remains green till after maturity and the seed crop makes good hay after threshing. The period of bloom is long owing to the fact that new heads mature successively for a month or more. It seems to be a hardy plant retaining its hold for several years on the same ground. It bears feeding down, which is not true of red clover. This plant according to Sweedish authority does not attain full luxuriance till the second or third year. This clover is considered more reliable than red. It is a first-class honey plant for tame bees. The root development is different from that of red clover, being fibrous and having no large top root.

White Clover. This species grows readily on all our soils, but it is very rarely sown. It is found in a wide diversity of soils and climates. The plant varies greatly in size, sometimes being very small, usually not over ten inches and sometimes fully two feet high (Gould). No other clover probably varies so much in size. The plant trails on the surface and forms joints which send down shallow roots. The central root penetrates deeply. This mode of growth enables the plant to successfully resist droughts. It is not sown for a field crop but is very valuable in pastures. Its rapid

production of leaves after being eaten off, its power to successfully contend with weeds, and its highly nutritive properties make it one of our best crops for grazing land. It is one of the finest honey plants.

Rabbit Foot Clover, and the two varieties of *Hop Clover* are not cultivated. They may have some value as grazing plants, but are not important.

Red Clover excels in yield of hay, in quantity of roots and so probably in effect on fertility, and in standing up better. Alsike excels in being finer and so producing a better quality of hay, in remaining in condition for cutting for a longer period, in being more permanent, in being more hardy, and in being a better honey plant.

COMPOSITION.

The clover plant is composed of the same elements found in all vegetable substance. American clover hay has been found to contain on an average 12.6 per cent water; 6.1 mineral matter; 81.3 organic matter.

The average composition of the dry substance of red clover after European analysis is as follows:

Organic	Carbon	47.8	%
	Hydrogen	5.0	"
	Oxygen	38.1	"
	Nitrogen	2.1	"
Mineral	Potash	2.26	"
	Soda	.14	"
	Lime	2.44	"
	Magnesia	.76	"
	Iron	.07	"
	Sulphuric acid	.22	"
	Phosphoric "	.67	"
	Chlorine	.26	"
	Silica	.18	"

Assuming that an acre of clover furnishes two tons of hay, the crop would contain the following quantities of the various elements and compounds, as calculated from the above figures:

Carbon	1671.	lbs.
Hydrogen	174.8	"
Oxygen	1332.	"
Nitrogen	63.4	"
Potash	79.	"
Soda	4.89	"
Lime	85.3	"

Magnesia	26.5 lbs.
Iron	2.45 "
Sulphuric acid	7.69 "
Phosphoric acid	23.42 "
Chlorine	9 10 "
Silica	6.29 "

These calculations are made for the part of the plant that is removed for hay. There remain the stubble and roots. In eight cases where the amount of roots of clover in an acre has been ascertained, the weight of roots free from water, but with more or less sand adhering, varied in the eight cases from 1343 pounds to 7026 pounds, averaging 3607 pounds. After deducting the weight of dirt adhering to the roots, as near as could be estimated, the average weight of roots appears to be about 2700 pounds per acre. Unfortunately we do not have the weight of the plant above ground in these cases, so we cannot state the relation the weight of the dry matter in the roots bears to the total weight of dry matter in the plant.

Assuming one to two as the relation of roots to tops, which is probably too low rather than too high a proportion of roots, and assuming for the organic part of the roots the same composition as the part of plant above ground, we have the following weight of elements in the organic or combustible part of the total plant:

Carbon	2506
Hydrogen	262
Oxygen	1992
Nitrogen	110

Of the more important mineral substances the whole plant takes, reckoned on the above basis, the following quantities:

Potash	118
Lime	127
Phos. Acid	35(?)

If instead of making a calculation of the amounts of nitrogen, phosphoric acid and potash in the total clover plant from an acre on the assumed relation of roots to tops, we add to the quantities calculated for the hay the actual pounds of these ingredients found in the stubbles and roots in several investigations, we shall obtain higher figures for the pounds of these valuable elements of plant

food. The figures would then stand for the crop from an acre, hay, stubble and roots, as follows:

	Hay.		Stubble and Roots.	
Nitrogen	73.4 lbs.	+	68.8 lbs.	= 142.3
Phos. acid	23.4	+	34	= 57.4
Potash	79	+	45.4	= 129.4

By neither method of calculation are the figures more than approximations, but they are sufficiently close perhaps to form a basis of comparing the clover plant with other crops grown on the farm. No very close study of tables showing the composition of farm crops is needed to convince us that the clover absorbs relatively large quantities of the valuable ingredients of plant food.

Clover and Fertility. Following very naturally this phase of our subject comes the question of the relation of clover to the fertility of the soil. We hear a great deal said about clover as a fertilizer, the renovation of worn-out farms with clover, and clover as a preparatory crop.

There must be some significance in these remarks.

Whether existing theories are false or true there is some reason why clover has become so prominent as a farm crop. The relation may be illustrated as follows: A farmer has a field in wheat this year, and instead of keeping wheat on the same land for next year, he sows clover, the following year cuts off a heavy crop of clover, then puts in wheat and gets a larger yield of wheat than if the crop of clover had not been grown. Or a farmer has two pieces of land alike in fertility. On one this year he grows a crop of wheat and on the other a crop of clover. The clover hay withdraws much more of the valuable elements of plant-food from the soil than the wheat, yet next year the land producing the clover would yield much more wheat than the other field sown to wheat for the second time.

Timothy, for instance, would not have this effect. Now what is the explanation of this?

The popular and somewhat mistaken notion has been that the clover collects from the atmosphere material that other crops do not, or greater in amount than other crops do, and so provides food for the succeeding crop.

The correct explanation of the immediate cause of greater growth of wheat after the clover than after wheat does not now seem difficult. The explanation is not that clover removes less from the soil than wheat. On the average, clover requires 240 pounds mineral matter for a crop of two tons, while a crop of wheat of 25 bushels

with the straw takes only about 76 pounds, less than one-third as much as the clover contains. Again, clover requires much more of those ash ingredients in which soils are most liable to be deficient.

	Clover.	Wheat.
Nitrogen	73. lbs.	50. lbs.
Phosphoric Acid	23.4 "	17. "
Potash	79. "	35.3 "

In spite of the fact that clover removes from the soil much more than wheat of the same kinds of material, the wheat seems to be more exhausting. The clover removes an especially large amount of nitrogen, and wheat is very sure to show in a most emphatic way any deficiency of available nitrogenous food, yet the clover prepares the soil for a wheat crop, rather than the reverse. On the other hand it is safe to say that the growth of timothy, containing much less nitrogen than clover, tends to unfit a field for wheat production. There are several directions in which to look for an explanation of these facts.

(1). *The root and stubble residue from clover.* The late Dr. Vœlker of England investigated more elaborately than any one else, perhaps, the effect on the soil of the growth of clover. He determined the amount and composition of roots from red clover under different conditions, on good soil and on bad soil, after cutting both one and two crops of hay, and after the grass was kept for seed. He analyzed, also, the soil from which the clover roots were taken in several cases. Dr. Vœlker's general conclusion was that the value of clover as a preparatory crop comes from the plant food that accumulates in the soil in an available form, especially nitrogen, during the growth of clover. This accumulation of plant food is due to the decaying leaves of clover, and to abundant growth of roots. The roots contain one and three-fourths to two per cent of nitrogen, which after decaying, before and during growth of the succeeding grain crop, supply the necessary plant food. Other crops leave a stubble and root residue, to be sure, that furnishes plant food, but it is much less in quantity and not so rich in nitrogen or the mineral ingredients. Dr. Weiske of Germany investigated the amount and composition of roots from several (eight) agricultural plants. He found that not only did clover furnish from two to four times the quantity of roots that other plants do, but that these roots are much richer in nitrogen, phosphoric acid and potash.

Roots and stubble contained	Lbs of air—dry roots and stubble per acre.	The roots and stubble contained					
		Nitrogen.		Phosphoric acid.		Potash.	
		Per cent.	Lbs. per acre.	Per cent.	Lbs. per acre.	Per cent.	Lbs. per acre.
Rye	3400	1.26	62	1.55	24	1.90	30
Barley	1515	1.15	22	3.15	11	2.59	9
Oats	2200	.71	25	2.08	28	1.48	24
Wheat	2240	.68	22	1.08	11	1.70	17
Red clover	6580	2.15	180	3.91	71	4.26	77
Buckwheat	1630	2.18	45	2.35	10	1.97	9
Peas	2400	1.76	53	2.24	14	1.70	11
Lapine	2800	1.76	58	2.53	13	3.13	16

As these observations were made on the same farm, the results are significant. Similar observations by Dr. Atwater on the College farm at Orono gave somewhat similar results.

The immediate cause, then, of value of clover as a preparatory crop is that its roots, stubble and decayed leaves supply a large amount of available food to the following crop. We now have to consider the source of this relatively large supply of plant food furnished by clover. Where does the clover get so much nitrogen, phosphoric acid and potash, that other species of plants are not able to acquire, even in much smaller quantities, under similar circumstances?

It is certain that the plant must get its supply of mineral matter such as phosphoric acid and potash from the source common to all other plants, the soil. The organic matter of the plant is largely gathered from the air, but other plants gather as much from this source.

One element, nitrogen, of which the organic portion partly consists, we have regarded as being almost entirely taken in through the roots in the form of nitrogen compounds. But a belief exists, in the popular mind at least, that the large amount of nitrogen which clover can gather is accounted for by the fact that this plant takes nitrogen from the air in a manner peculiar to certain species of the clover family.

Another view which is advanced is that the plants feed upon certain soil compounds which other agricultural plants do not find available for food to so great an extent. So we have two points to discuss, viz.:

1. The relation of the clover plant to atmospheric nitrogen.
2. The peculiar power of the plant to feed upon soil compounds.

These questions can scarcely be considered separately.

The only sources from which it is possible for a growing plant to draw its nitrogen are the seed planted, the nitrogenous compounds of the soil, and nitrogen absorbed by the leaves from the air, either combined or free. The air may, and certainly does, supply nitrogen to plants through that which is first absorbed by the soil and then taken up by the roots. It may be considered as extremely probable that all our agricultural plants get nitrogen in all the ways mentioned above, with one exception, viz: The absorption of atmospheric free nitrogen.

It is claiming too much to say that we have any proof that the leaves of any species of plants absorb free nitrogen.

In fact what evidence we have that bears on this point is almost entirely opposed to the view that free nitrogen is available.

There are some investigations which show that the nitrogen of certain plants is considerably in excess of that in the seed plus the loss from the soil, but no safe conclusion can now be reached as to whether the nitrogen compounds of the air may not have supplied all that cannot be accounted for from these two sources either through the leaves directly or through the roots after absorption by the soil—in fact it seems most reasonable to suppose that this is the case. Whatever may be the truth in this direction, we have good reason for believing that the clovers can accumulate more nitrogen from sources outside the soil supply than is the case with other species of agricultural plants.

This is a fact of importance, provided the amount of nitrogen thus secured is large enough to add materially to the resources of the farm, but about this we can make no definite statements. The fact of main importance in this connection is that from all sources combined, clover is able to collect much more nitrogen than the grains and other true grasses, doing this under conditions where wheat, oats, corn, and timothy fail to do well on account of a seem-

ing lack of available nitrogenous food. How shall we explain this fact? Setting aside the theory of an atmospheric supply through the leaves, there are three prominent explanations offered.

(1). The roots penetrate deeper and have larger feeding ground than other plants.

(2). The roots can feed upon certain organic compounds not available to other kinds of plants.

(3) Nitrogenous material is made available to the plants by bacteria which have their home in tubers on the roots of certain legumes.

The first two of these explanations are made to seem fairly reasonable by obvious facts and by the results of investigations in regard to the feeding power of the clover plant. The last explanation is at present scarcely more than a hypothesis, and it would be out of place to discuss here the scientific data behind it. We can afford to wait for science to furnish new explanations or verify old ones, so long as we are sure of the one fact of practical importance, viz: that clover causes an accumulation of nitrogen in the place and in the forms that render it available to the cereal farm crops. Much can be learned in this connection by studying the effect of a variety of fertilizers upon the growth of clover.

EXPERIMENTS OF LAWES AND GILBERT.

These experimenters found that mineral manures alone were as favorable to the growth of clover as when mixed with ammonia salts; yard manure proved no more beneficial than mineral manure alone.

EXPERIMENTS AT PENNSYLVANIA STATE COLLEGE.

The plots were seeded with the usual mixture of timothy and clover seeds. No clover grew with a complete fertilizer containing nitrogen as nitrate of soda, but the growth of timothy was heavy. With any form of nitrogen the clover decreased as the amount of nitrogen in the fertilizer increased.

Dried blood proved to be the best form of nitrogen for clover, but any organic nitrogen would probably have done as well. The most clover grew where no fertilizer was applied, with potash salts and with plaster. An increase of yard manure decreased the clover.

It seems probable that nitrogenous fertilizers were not injurious to the clover, but when these were applied the conditions were so favorable to the growth of timothy that the clover was crowded out.

EXPERIMENTS CONDUCTED BY NEW JERSEY EXPERIMENT STATION.

These show the beneficial effect of mineral and the comparative small effect of nitrogenous fertilizers. Numerous other experiments point to the failure of nitrogenous fertilizers to cause much increase in growth of clover.

DR. KEDZIE'S EXPERIMENT.

He planted wheat and clover in muck free from nitrates. The clover made use of many times more nitrogen in the organic form than did the wheat.

All these experiments point to the fact that clover is to a large degree independent of an artificial nitrogen supply. If this plant is furnished with sufficient mineral manures it can get its own nitrogen largely from natural sources. In considering the effect of clover upon the fertility of the farm through the accumulations of plant food in the roots and stubble, we should not forget the manure residue of the clover hay that may be consumed on the farm. A comparison of the plant food in this residue with that of other common cattle foods is made by the aid of the following table:

	Quantities contained in one ton of product.		
	Nitrogen.	Phosphoric acid.	Potash.
	lbs.	lbs.	lbs
Hay from mixed grasses	31.	8.6	32.
Clover hay	39.4	11.2	37.2
Barley	32.	15.6	9.4
Oats	38.4	13.6	9.6
Corn	32.	11.4	7.4
Potatoes	6.8	3.2	11.6
Turnips	3.6	1.6	3.6
Oat straw	11.2	5.6	32.6

It is plain that clover takes a comparatively high rank among our common farm crops as a source of fertility through the feeding of stock.

A small percentage of these ingredients is abstracted from the hay by the animal, but as this loss is relatively about the same for all foods, the ratio of the manurial values of the manure residues is practically the same as for the foods themselves.

CLOVER AS A CATTLE FOOD.

It is characteristic of leguminous plants, and so of the clovers, that they furnish fodder much more nitrogenous than that from the true grasses. As food for young cattle and milch cows, clover hay is undoubtedly much superior to timothy hay.

The digestibility of clovers is not far from the same as that of the true grasses. There is great difference, however, in the relative amounts of the different kinds of material that are digested from 100 pounds of clover hay and the same amount of timothy hay for instance. While about the same amount of total organic matter is digested from the clover as from true grasses, this material differs in character in the two cases.

Observations made by the Maine Experiment Station in 1887 on the yield and digestibility of both timothy and clover hays bear upon this point, and the discussion of the matter as given in the station report for 1886–7 is quoted below:

"The small lots of hay used in the digestion experiments were selected to represent as nearly as possible large lots of hay that were in each case the product of one acre. An acre of pure timothy grass and an acre of nearly pure alsike clover were cut and stored separately. The two lots were weighed when housed, and again on Dec. 20th. We have therefore the following data, from which we can reckon the amounts of digestible material of various kinds, per acre:

(1) The composition of the dry hays.

(2) The digestibility of the several ingredients of the hays.

(3) The production of dry hay per acre.

The composition of the hays as shown in the previous fodder analyses is given in this connection.

	Contained in 100 lbs. of		Digested from 100 lbs of	
	Timothy hay.	Clover hay.	Timothy hay.	Clover hay.
	lbs.	lbs.	lbs.	lbs.
Dry substance	88.66	88.90	45.7	48.3
Organic matter	84.91	82.63	44.5	46.4
Protein	5.94	10.06	2.7	5.6
Crude fiber	28.89	30.36	12.4	14.0
Nitrogen-free extractive matter	47.41	39.24	27.9	25.2
Fat	2.67	2.97	1.4	1.5

The yield of dry hay from the acre of timothy was 3875 pounds, and from the acre of clover, 4075 pounds, the difference being only two hundred pounds. They were representative lots of grass with high cultivation. Here follow the quantities of digestible material per acre:

	Digested from 3,875 lbs. Timothy hay.	Digested from 4,075 lbs. clover hay.
	lbs.	lbs.
Dry substance	1,770.8	1,968.2
Organic matter	1,724.4	1,890.8
Protein	104.6	228.2
Crude fiber	480.5	570.9
Nitrogen-free extractive matter	1,081.1	1,026.9
Fat	54.2	61.1

The chief difference in the digestible material furnished by the two kinds of hay is that the clover supplies over twice as much digestible protein as the timothy. The comparison of these hays is discussed in detail and at some length, because from timothy and clover comes the bulk of the hay raised and consumed in Maine, and

a clear understanding of the relative value of these fodders is important."

There is a gradual and constant change in the composition of clover grass up to the time of ripeness. These changes are a decrease in the percentages of ash, protein and fat, and an increase in the percentage of crude fiber. This is shown by numerous analyses which are given later.

Again, the actual amount of digestible food obtained at the different periods of growth should be considered. Investigation has shown that the plant continues to grow until the time of ripening, but on the other hand, with red clover the lower leaves begin to die and drop off as the plant approaches full bloom and begins to brown, and the plant grows less palatable. Investigation has shown, moreover, that the substance of the plant becomes less and less digestible as it matures. This matter has been investigated by cutting equal areas of clover at different periods of growth, and investigating its composition, yield and digestibility.

Table showing various analyses that have been made of Clover at different stages of growth.

	Ash.	Protein.	Fiber.	N-free extract matter.	Fat.
Heads formed..	7.73	18.36	23.37	46.96	3.58
	8.34	14.27	27.75	47.93	1.71
	8.89	25.51	13.09	46.71	5.80
	8.32	19.38	21.40	47.20	3.70
Full bloom.....	7.07	14.66	28.06	47.05	3.16
	7.65	13.48	27.79	48.70	2.38
	8.31	19.14	15.91	51.85	4.79
	7.67	15.76	23.92	49.20	3.45
After bloom....	6.60	13.69	36.40	40.23	3.08
	7.34	13.13	29.87	47.86	1.80
	7.25	18.09	19.91	50.13	4.62
	7.06	14.97	28.72	46.08	3.17
Ripe.....	6.19	12.52	37.50	41.01	2.78
	6.50	10.35	31.75	49.00	2.40
	7.35	15.24	19.11	54.33	3.97
	6.68	12.70	29.45	48.12	3.05

AVERAGE COMPOSITION AT DIFFERENT STAGES OF GROWTH.

Heads formed.....	8.32	19.38	21.40	47.20	3.70
Full bloom	7.67	15.76	23.92	49.20	3.45
After bloom	7.06	14.97	28.72	46.08	3.17
Ripe.....	6.68	12.70	29.45	48.12	3.05

These figures show, without exception, that the plant grows more woody and less nitrogenous as it matures. The yield must be considered also. Only two investigations have been made in this country that give data for judging in regard to the matter of yield, one by Prof. Alwater with clover cut on Maine State College Farm, and one conducted by the writer on the Central Experimental Farm of the Pennsylvania State College.

The results are not conclusive, of course, but the evidence has considerable weight, especially as in the case of the last investigation where considerable areas were used, duplicate plots were cut.

The following table shows the average yield at several stages of growth.

	Dry substance per acre.		
	Maine.	Penn.	Average.
	lbs	lbs	lbs.
Full bloom	1410	3680	2545
Heads beginning to die	1750	3420	2685
Ripe	1523	3361	2442

The indication from these experiments, especially the one in Pennsylvania is that after the period of full bloom, less dry substance is harvested, than if the clover had been cut earlier. This does not mean that the plant makes no growth after bloom, but that the loss from decay and the dropping off of leaves more than balance this growth.

Another point is the matter of digestibility. There is abundant evidence that fodder plants decrease in digestibility with increasing age. The results of one investigation with clover hay will serve to illustrate this fact. The period of growth and the digestibility of the constituents of the hay as ascertained experimentally are given in the table below. The experiment was made with oxen.

	Digestibility.			
	Protein.	Crude fiber.	Nitrogen-free extractive matter.	Fat.
Just before bloom	76	51	70	58
In full bloom	65	47	68	64
End of bloom	59	40	66	60

As we do not know the actual digestibility of the hays in the investigation quoted in regard to amount of growth, we can not calculate the actual quantities of digestible material, but it is certain that in these cases less digestible material was harvested during the latter stages of growth than when the plant was in full bloom. The conditions under which clover is cured affect the composition and value of the hay to a more marked degree than is the case, perhaps, with any other fodder plant the farmer handles. In the first place the plant is a difficult one to dry owing to the coarseness of the stalks, especially when cut at what is, undoubtedly, the best time, the period of full bloom.

If not dry enough it ferments in the barn and thus loses in value. If handled considerably in the field and made as dry as other hay can safely be made, there is danger of a serious loss of the leaves, which are the most valuable part of the plant. Investigation shows, also, that the composition of the hay is seriously modified by having it wet with rain, the protein and soluble matters diminishing, this being brought about probably by combined fermentations and leaching.

This is shown by a single analysis which has been made of different portions of the same hay, well cured, and subjected to wetting by rain.

	Water.	Protein.	Crude fiber.	Nitrogen-free extractive matter.	Fat	Ash.	Total matter soluble in water.
Hay well cured	14.11	11.22	32.68	35.33	2.40	4.26	27.77
Hay wet with rain for several days	14.76	8.15	43.02	29.60	1.61	2.86	15.34

It is very difficult to dry water out of clover stalks, and all farmers know what bad fodder musty clover is.

Clover hay, like all other hay, is affected by keeping, not so much in composition as in digestibility.

Wolff ascertained the digestibility of a hay in October and then again the next March, with the following result:

	Organic substance.	Protein.	Crude fiber.	Nitrogen-free extractive matter.	Fat.
Digestibility in October.....	61.9	61.5	66.6	60.3	42.1
Digestibility in March.....	59.7	53.8	60.6	62.5	41.6

Hofmeister also determined the change in digestibility caused by keeping clover hay a much longer period of time.

	Organic substance.	Protein.	Crude fiber.	Nitrogen-free extractive matter.
1866 in September.....	66.8	68.4	51.2	73.4
1870 in March.....	52.	50.7	50.4	40.7

Rowen, or second crop clover, does not seem to differ materially in composition from first crop clover. Many farmers think it is poor fodder. This belief doubtless comes from the fact that it is cut when very green, and at a time when the weather is not favorable to curing, so it is likely to be poorly cured and then it afterward ferments. Rowen usually contains considerable water as compared with hay from the first crop of grass, and so the same weight has a less equal food value.

In some States clover has come to be considered a valuable soiling crop. An acre of land, well manured, will produce a large amount of green food when sown to clover. Two crops can be cut on a rich soil, and have time left to seed the ground to winter rye (where this crop can be grown) which furnishes food very early in the spring.

THE USE OF CLOVER AS A FODDER.

As has already been indicated clover differs from the grasses in composition, and so it can fill a somewhat different place in the ration than timothy, corn fodder, corn ensilage, straw, etc. The table be-

low gives the composition of several fodders common in Maine, and of a few of the grains:

Name.	No. of Analyses.	Average composition.					
		Water.	Ash.	Protein.	Crude fiber.	Nitrogen—free extractive matter.	Fats.
Clover hay	33	11.47	6.23	12.55	26.86	40.55	2.44
Timothy hay	53	10.26	4.11	6.06	30.37	47.10	2.12
Red top	1	9.84	6.99	7.25	27.45	46.52	1.95
Orchard grass	4	8.23	5.35	6.33	33.81	44.45	1.93
High meadow hay	2	10.98	6.23	7.57	25.78	47.19	2.25
Maize stover, field cured	9	22.83	4.86	5.38	25.18	40.30	1.45
Maize fodder, ensilaged	57	80.52	1.31	1.49	5.68	10.26	.68
Oat straw	12	8.74	4.81	3.82	41.52	38.89	2.22
Maize, dent, (western corn)	80	10.09	1.54	10.33	2.28	70.66	5.10
Maize, flint, (New England corn)	70	11.07	1.44	10.57	1.65	70.31	4.96
Oats	25	10.94	2.97	11.38	9.85	60.05	4.81
Barley	9	10.92	2.38	12.39	2.57	69.88	1.86
Wheat bran	63	12.36	5.70	15.07	8.71	54.26	3.78
Cotton-seed meal	29	8.32	7.26	43.29	5.69	22.97	13.37

A glance at the above figures shows that with the exception of wheat bran and cotton-seed meal clover is the most nitrogenous food in the list. In other words, it contains more of that particular kind of material which alone can be used to produce flesh and the nitrogenous constituents of milk than most other common cattle foods. This is a fact which should be recognized in the practice of cattle feeding.

For instance, farmer A produces timothy mostly, mixed to a certain extent with the other true grasses, while farmer B's hay is mostly clover. Both are feeding milch cows, and they purchase grain to supplement the hay ration. These farmers should plan their rations so that the amount of digestible nitrogenous material fed daily shall not fall below a certain quantity necessary to furnish milk solids and maintain the vital processes. If they buy their grain with reference to making a properly combined ration, farmer A will need to purchase material more highly nitrogenous than farmer B.

Let us suppose that both farmers were to feed corn meal alone as a grain ration, each feeding 18 pounds of hay and 6 pounds of meal. The amounts of the different kinds of digestible ingredients consumed by the cows in the two cases would be as follows:

Farmer A's Ration.

	Total organic matter.	Pounds of digestible material.				Nutritive ratio.
		Protein.	Nitrogen-free extractive matter.	Fats.	Total nutritive substances.	
Timothy hay, 18 lbs.....	15.3	.483	7.25	.26	7.99	
Corn meal, 6 lbs.....	5.2	.49	3.85	.26	4.60	
	20.5	.973	11.10	.52	12.59	1: 12.7

Farmer B's Rations.

Clover hay, 18 lbs.....	14.9	1.00	7.04	.28	8.32	
Corn meal, 6 lbs.....	5.2	.49	3.85	.26	4.60	
	20.1	1.49	10.89	.54	12.92	1: 8.2

These figures show that while the two rations contain practically the same amount of digestible material, farmer B's furnishes over half a pound or fifty per cent more than A's of digestible protein. Both rations are deficient in digestible protein according to the German standard, but A's is especially so. If, instead of feeding 6 pounds corn meal, A feeds a mixture of 4 pounds corn meal and 2 pounds cotton-seed meal, he will have a ration not unlike B's ration of clover hay and corn meal. This is shown by the figures below:

	Total organic matter.	Pounds of digestible material.				Nutritive ratio.
		Protein.	Nitrogen-free extractive matter.	Fats.	Total nutritive substance.	
	lbs.	lbs.	lbs.	lbs.	lbs.	
Timothy hay, 18 lbs.. ...	15.3	.483	7.25	.26	7.99	
Corn meal, 4 lbs	3.4	.327	2.63	.17	3.13	
Cotton-seed meal, 2 lbs...	1.67	.78	.40	.20	1.38	
	20.37	1.590	10.28	.63	12.50	1:7.5

The lesson to be drawn from these illustrative rations is that a farmer who grows clover can construct with a given weight of food a more efficient ration out of the ordinary farm crops than a farmer who's fodder consists of hay from the grasses.

The grains, corn, barley and oats are not highly nitrogenous and experience and experiment have taught that it is economy to use them in connection with one of the oil meals whenever the ordinary coarse fodders of the farm are being fed. If, however, the hay in the barn is largely clover, there is less need of the purchased foods, which is a point especially worth considering by those farmers remote from railroads. A word or two in regard to the proper mixture of foods such as are ordinarily produced on the farm. The winter bill of fare of our farm animals consists in general of the following materials: Timothy hay and hay from the grasses, clover hay, straw, corn fodder, ensilage, potatoes, roots, corn, barley, oats. It is possible to mix these materials so as to feed a ration strikingly and seriously deficient in protein, as it is also possible to so combine these foods that the deficiencies of one shall be somewhat compensated by the different composition of another. The proper place for clover in feeding out this list of foods is to combine it with the ensilage, corn fodder, straw, potatoes or roots, or even with the timothy, in order that its protein may balance to some extent the lack of nitrogenous substance in the foods mentioned. When the oats and barley are freely fed, or as is the custom in some sections, when a mixture of ground peas and oats constitute a part of the ration, the clover hay can better be left out. These suggestions are especially applicable to the feeding of growing animals and milch cows.

THE GROWING OF CLOVER.

It is probable that many farmers fully appreciate clover as a fodder to be consumed on the farm, but in attempting to grow this crop they are confronted with difficulties. The plant runs out, sometimes only one, and generally at most only two crops being obtained from the same field after seeding down. Sometimes the crop does not continue because the roots are thrown out of the soil by frost. This is true on heavy clay soils, especially when they are very wet. The remedy for the effect of frost would seem to be drainage, but it is not unusual to see clover roots standing out of the ground after a hard winter, on well-drained fields.

Making all allowances for frost, clover does not seem to thrive even as well as in former years. In other countries, especially in England, farmers have come to speak of "clover sickness." The meaning of this term is that clover refuses to grow on certain soils either at all or only at quite long intervals. This condition of things comes about on soils where clover has been grown for some time. In Maine, farmers sometimes complain that they cannot even get a "catch" of clover, and the same complaint is heard in other States. A knowledge of the causes that produce the so called "clover sickness" in soils has been much sought after, and the matter has been the occasion of almost as many theories as there have been investigations of the subject. The following are some of the causes that have been proposed as an explanation of "clover sickness" or the apparent inability of a soil to support a clover crop at all, or only at long intervals.

(1) Exhaustion of deep layers of soil.
mineral matters in soil.
potash, especially.
special forms of organic matter.

The theory of soil exhaustion in some form seems to be the most natural one by which to account for the failure of clover to grow on fields where it has been successfully cultivated for a long period of years, but a full acceptance of this theory is prevented by the fact that in some cases the most liberal manuring with a complete fertilizer or with yard manure, fails to remedy the difficulty. Lawes and Gilbert in their experiments found themselves unable by any sort of manuring to produce clover with certainty and at short intervals. This was the case even on experimental plots where there must have been an accumulation of plant food.

Mohr, a German experimenter, thinks that "clover sickness" is due to the exhaustion of deep layers of the soil, and that the reason why manures fail to quickly remedy the trouble is that they enrich only the upper layers, and that it is some time before the plant food reaches the deeper strata.

Several scientists who have expressed opinions on this subject, believe that a lack of available mineral matter is the cause of the failure of clover to grow. This view has the support of those cases where mineral manures alone have exerted such a marked favorable effect. (See results of experiments previously quoted). The effect of wood ashes in causing clover to spring up where none had been

noticed has led to the theory that a lack of potash is the general cause of "clover sickness." When we remember, however, that wood ashes contain all the mineral elements of plant food, and that the carbonate of lime present undoubtedly has the effect of increasing the decomposition of the mineral matters of the soil and also of hastening changes in the organic portion, one cannot be sure that the potash of the ashes is the only factor in the effect produced. Lawes and Gilbert in an elaborate discussion of the causes of the failure of clover, express themselves as inclined to the view that the chief cause is the exhaustion from the soil of organic matter in that stage of decay peculiarly adapted to the uses of the clover plant. While on their experimental plots, as before stated, no methods of manuring restored the soil to its former capacity to grow clover continuously or at short intervals, yet they produced six successive heavy crops of clover on a very rich garden soil in which there was probably a large accumulation of organic matter.

(2) Effect of parasites and insects.

Some have offered the explanation that clover fails where it has been grown for some time because of the injury of parasites, or the depredations of insects. It is probable however that parasites and insects are successful in destroying clover only when it is in a weak condition from other causes. The injury effected in these ways is a result rather than a cause.

(3) Effect of root excretions.

It was Liebig's opinion that the reason why clover cannot in many cases be grown continuously with success on the same soil is that the roots give off an excretion that by accumulation becomes poisonous to the plant. In discussing this view Lawes and Gilbert argue that these excretions would decay in a short time, whereas several years are required to restore the clover producing power of a soil. They claim also that the excretions of a plant are not injurious to it.

The above are the principal explanations that have been offered to account for the failure of clover to grow where its culture had previously been fairly successful. When the truth is known it will probably be found that a lack of some form of available plant food combined in some instances perhaps, with unfavorable physical conditions of the soil is the real explanation of "clover sickness."

During a five years' residence in Pennsylvania in a region where clover is regarded as the main crop essential to profitable farming,

the writer noticed that only those farmers who depended on clover entirely and ignored manures, complained of a failure of clover. On those farms where good cultivation had prevailed, and where a stock of cattle had been fed, adequate to the needs of the farm, clover seemed to grow with its old time luxuriance.

The capacity of clover to add to the fertility of the farm is an important consideration, but this capacity has been so exaggerated, and the way in which clover produces its good effects has been so entirely misunderstood, that many farmers have placed upon this useful plant the entire burden of keeping up the fertility of the farm. This it cannot do. It is not a plant adapted to poverty farming. Its peculiar office is to aid in making a larger use of the capital stock of fertility, but it cannot create something out of nothing. There is, unquestionably, a chance for a larger profitable use of clover in Maine agriculture; as has been shown, it combines with its favorable influence upon fertility the quality of being a cattle food superior to the grasses.

The following suggestions embody, it is believed, the principal essentials to successful clover production.

(1) As deep plowing as is consistent with the soil cultivated.

(2) A more rapid rotation of crops than Maine farmers usually practice. This is especially important.

(3) The liberal use of mineral manures, such as plain superphosphates, potash salts and ashes, in combination with yard manure.

(4) Careful selection of seed.

(5) No grazing of mowing fields. The clover plant will not bear grazing, white clover excepted.

(6) Good drainage.

STOCK FEEDING.

By Prof. G. H. Whitcher, Director of New Hampshire Experiment Station.

Food for an animal must have certain characteristics; first, it must be palatable, having no disgusting flavor; second, it must contain certain chemical characteristics, that is, there must be starch, sugar, oil, and nitrogenous matter contained in the food; third, these substances must be digestible, capable of being dissolved by the juices of the stomach. These three characteristics cover the

ground fully, if we keep in mind the fact that the food of every animal must be first prepared by growing plants.

The great balance in nature's book is made possible only when both plants and animals are taken into the account. Plants have certain peculiarities which in a general way distinguish them from animals. The growing blade of corn after it has used up its little store of food prepared and ready in the kernel, has a power of gathering in carbonic acid through its leaves, water and ash ingredients by its roots and perhaps through its leaves also. That is, it takes up dead unorganized (inorganic) matter from the soil, air and water, and by its own peculiar process these dead substances are combined into the living organic matter. Thus starch and sugar are each made up of the carbon contained in carbonic acid gas and of the hydrogen and oxygen in water, but in this process there is a surplus of oxygen which is given off by the leaves of the plant.

On the other hand an animal breathes in pure air and instead of expelling pure air from its lungs, gives off air charged with carbonic acid gas. This is why man or an animal is suffocated if enclosed in a tight closet. The oxygen which alone can sustain animal life is, in the system, combined with the carbon of the food consumed, and comes off from the lungs as carbonic acid gas. On the other hand a plant, if placed in a glass bell jar, soon uses up the carbonic acid of the air, and over-charges the limited atmosphere with oxygen so that it too suffocates or dies; but if a mouse and a small plant are both placed under the bell jar the one will give off carbonic acid with which to feed and nourish the other, and *vice versa*. All plants and no animals would in time give an atmosphere over-charged with oxygen. All animals and no plants (provided there was food for the animals) would in time give an excess of the carbonic acid gas.

Some one may ask, what has all this to do with practical stock feeding? It has a great deal to with a correct understanding of the changes of dead earth to plant matter, plant matter to animal matter and animal matter to dead or inorganic matter again.

Once more. No animal can by any possibility obtain food from the elements in earth and air. All animal life is absolutely dependent either directly or indirectly upon vegetable matter for its existence, and, therefore, it is of the greatest importance that we know first of all the character of this vegetable matter. On this point chemical analysis must be our teacher. However well it may be known by the practical and skillful that clover hay and corn meal

combined give a most valuable ration, it nevertheless remains for chemistry to tell us why these two forms of food are especially valuable, and if we are ever to get at exact results, rather than guesswork, it will be through the aid of the chemist and physiologist who alone can answer to the question: What is food, and how does it act in the system?

Food is any substance that can support life, maintain health and cause growth. A complete food is one that can fulfill all of these requirements. Looked at from the standpoint of the chemist food is organic matter, formed from the elements contained in earth, air and water by the action and growth of plants, or, to speak more definitely, food consists of various substances such as water, starch, sugar, glucose, oil, vegetable acids, albuminoids, etc., and the character of any given food, its value, etc., depends upon the proportion in which these various substances are found. I may, perhaps, illustrate this by giving the composition of two fodders well known, first stating, however, that the composition here given, is the total composition and not the digestible matter which will be spoken of later. I have selected two foods of very different composition to show more clearly the idea that the proportion in which the various parts exist has much to do with the value per cent.

The following table shows the percentage composition of corn meal and southern corn ensilage.

100 lbs. contain	Corn Meal.	Ensilage.
Water	12 0	79 58
Albuminoids	10 0	1.22
Starch	60.0	5 00
Fiber	5.4	3.08
Sugar	3 5	9.26
Gum	3.0	1 00
Fat	5 0	
Ash	1.1	.76
	100	99.90

The above table presents a complete analysis put in the practice tables for stock feeding; the starch, sugar, fiber and gum are included under the general term carbo-hydrates and by considering these we have the following:

	Corn Meal.	Ensilage.
Water	12.0	79.58
Albuminoids	10.0	1.22
Carbo-hydrates	71.9	17.34
Fat	5.0	1.00
Ash	1.1	.76
	100	99.90

The value of any food depends of course upon its dry substance, that is, the nature of the food need not ordinarily be considered, as the animal will make up at the trough what is lacking in the food, although there is a question as to this which I shall speak of again. Corn meal in 100 pounds has 88 pounds dry matter, while 100 pounds of ensilage has only 20 42. That is, corn meal has $4\frac{1}{3}$ times as much total food matter in it as ensilage. Well cured English hay has not far from 12 per cent of water in it. Roots average 80 per cent of water; cotton-seed meal has 10 per cent, gluten meal 10.5 per cent, etc.

There is another thing which effects the value of a fodder more than its total per cent of dry matter. It is the ratio existing between albuminoids and the non-albuminoids or carbo-hydrates and fat, but before we consider this it will be best to take up the matter of digestibility of food.

DIGESTIBILITY OF FOOD.

An examination of the composition of foods shows that in general vegetable matter consists of albuminoids, or substances resembling the whites of eggs, carbo-hydrates, or sugar, starch, gum, etc., and fats or oils which in many cases constitute a large per cent of seeds e. g. in cotton-seed, linseed, etc.; but while the chemist can give us the total composition of any given vegetable product he cannot, in his laboratory, tell how much of this is available to the animal. This link in our chain must be forged by the physiological chemist.

When we feed our cows or oxen a hundred weight of the corn meal, the analysis of which was given, we are not feeding ten pounds of available albuminoids and 71.9 pounds of available carbo-hydrates because a part of this material goes through the system unchanged, hence has no nutritive effect. We may illustrate this by calling to mind a ton of mixture of coal and gravel stones; for example, suppose 1,500 pounds of the best stove coal is mixed with 500

pounds of stones, and we use the mixture for fuel. It is evident that the fuel value of the whole would be only that 1,500 pounds, because that alone would burn in the stove. In just the same way the albuminoids, carbo-hydrates and fat in corn meal are made up of two parts, one digestible and the other indigestible. The former, being consumed in the system, helps to maintain life and is the true source of value to the food as far as the animal is concerned, corresponding with coal in our illustration. The undigested materials take no part in the maintenance of life and are to the whole food what the stones are to our mixed fuel. Now if we were buying a mixture of coal and stone with which to feed our stoves we should pay only in proportion to the actual coal present, and if we were to buy food materials for our farm animals, or to raise the same, we ought to value them, not in proportion to their total composition, but to the available or digestible portion of the various substances of the food, and to this available part the term nutrients has been applied. The method of determining the digestibility of the several constituents of food is briefly as follows: An animal is placed in a tight stall where no loss can take place, the food consumed is weighed and samples analyzed and the solid excrement is also weighed and analyzed. The difference in amount of each substance taken into the system and the amount of the same voided in the manure shows the part digested. Thus if all the albuminoids were digested none would appear in the solid excrement, or at least but a small amount. On the other hand if one-half as much appear in the manure as was contained in the food consumed, then 50 per cent of the total albuminoids of the food were digested. This of course is a general way of determining the nutrients in a food, but many precautions are taken and various ways devised to check the work and eliminate the errors.

Thus far, then, we have seen that foods are made up of unlike parts; that only a portion of each material contained in a given food is digestible or available to the animal, and we have seen how the investigator determines the per cent of digestibility by feeding and analysis. We will next illustrate and enforce by a few examples.

Experiments with the horse show that on the average 78 per cent of the albuminoids are digested, 63 per cent of the fat and 95 per cent of the carbo-hydrates. Applying these figures to the corn-meal, the analysis of which has been given, we get the following table, which shows: First, total composition; second, per cent of

digestibility, and third, the amount of digestible material in one hundred pounds.

Composition of Corn Meal.

	Total per cent of digestibility.		Digestible material per 100 pounds.
Water	12.0	100	
Albuminoids	10.0	.78	7.8
Carbo-hydrates	71.9	.95	68.3
Fat	5.0	.63	3.15
Ash	1.1		
	100.0		79.25

That is, out of 88 pounds of dry matter about 80 pounds are available, or true nutrients, capable of supporting life, producing beef, pork, milk, wool, or muscular force. The course of digestion is in brief as follows: In the mouth the food is crushed and mixed with saliva, a juice capable of changing starch into sugar; in cud-chewing animals (ruminants) the food is again brought to the mouth and re-ground and mixed, and passed directly from the mouth to the fourth or true stomach, where digestion proper commences; in this stomach the gastric juice is found, and by its action the insoluble albuminoids are made soluble and thus rendered available to the animal after the food passes from the stomach; it is mixed with bile or gall and with the pancreatic juice, the former acting on the fat of the food and the latter on the starch and albuminoids.

The following recapitulation taken from Armsby will give a concise veiw of the whole process. "We see, then, that the whole process of digestion is a simple conversion of the solid matter of food into forms which are soluble in water or the digestive fluids, and can, therefore, pass into the circulation. This is accomplished in the case of the albuminoids by the gastric juice in the stomach and the pancreatic juice in the intestines; in case of starch, etc., by the saliva and pancreatic juice, and in the case of the fats by bile and pancreatic juice."

USE OF FOOD.

The next subject which comes in the natural course of events is the use to which food is put in the animal system, how the various parts act, and what is the function of the albuminoids and the fats, in connection with the composition of the animal body.

The body of an animal is made up of various materials; there is fat, the lean or muscle, the bone, the hair, the "cords" or tendons, etc., and all of these parts vary in chemical composition. Now, if we start with a calf weighing 100 pounds, and produce from that calf an ox weighing 1,500 pounds, we must add to the 100 pounds 1,400 pounds; and this must come from the food and drink given to the animal. Hence it may be well shown in tabular form the exact amount of the various constituents in both the calf and the ox and see how these vary:

	Calf weighing 100 lbs.	Ox weighing 1500 lbs.	Difference.
Water	65.1	840 lbs.	774.9
Albuminoids	15.7	270 "	254.3
Fat	15.3	315 "	299.7
Ash	3.9	57 "	71.1
	100	1500 lbs.	1400.0

It is easy then to see that one use of the food consumed must be to furnish fat, albuminoids and ash with which to build up the increase of live weight, but if this were all, the question of stock feeding would be a very simple one.

When we bring an ox in from the work on a cold winter day, with the mercury at zero or below, if we could determine the temperature of his blood it would be found to be not far from 101°. Or, again, take the same ox in mid-summer when the mercury is up to 90° and when the sweat is oozing from the body, and the temperature of the blood is the same 101°. Of course in cold weather the tendency of the body is to grow cold, just as a pail of boiling water if set out in an atmosphere 10° below zero becomes cold and finally frozen from loss of heat. So the body of an animal loses heat, and but

for the processes going on in the body, it would become frozen. It is evident, then, that the food consumed must keep up the temperature of the body just as the wood put in a cook stove keeps up the temperature of the oven. This last production is another use to which food is put in the animal body.

When a steam engine is at rest and there is no use of steam for any purpose, the fire under the boiler is banked or the drafts so arranged that very little fuel is consumed; but when the engine is started and made to do heavy work it is necessary to burn the fuel as rapidly as possible, and the more fuel there is consumed the greater the amount of work can be done in a given time, within reasonable limits of course. The same is true of an ox or a horse. If either is standing idle in the stall doing little or no labor the food required is scarcely more than one-third the amount necessary when the same animal is doing hard labor; the production of force is a third use of food. To re-state this then, food is needed by animals, first, to produce increase of live weight; second, to produce heat; third, to produce force. And it becomes desirable to know whether various parts of the food, as for example, the albuminoids, carbo-hydrates and fats, have a common effect, or whether one part produces one effect and another part another effect.

Take the matter of increased live weight and we find it to be made up of muscle, fat, bones, etc., and the muscle is chemically the same composition as the albuminoids of the food by the table above given. It is seen that a calf on growing from a live weight of 100 pounds to 1,500 pounds increases the albuminoids in his body 254.3 pounds, and it is proven by various methods that this increase must come from the albuminoids contained in the food; the increased weight of fat, nearly 299.7 pounds may come either from the albuminoids, fat or carbo-hydrates, or more likely from these combined. The production of heat is considered as depending upon the chemical changes which the carbo-hydrates undergo, and according to Youman, force is produced from the changes in both albuminoids and carbo-hydrates. A re-statement of the case gives us the following, as being most likely:

The 255 pounds of albuminoids come from the albuminoids in the food. The 299 pounds of fat may come either from the fat, carbo-hydrates or albuminoids. The production of heat depends upon the chemical changes in all the food, and the production of

force most probably depends upon the changes in certain carbohydrates in the muscular tissues.

Under the head of flesh production also comes the production of milk and wool, for these are the results of the same causes which produce a pound of muscle or of fat within the system. The changes which food undergoes in the animal body are very complex and the chemistry of the changes between hay and grain, and milk and flesh is shrouded in mysteries at least in many of its details. It is true, however, that animals are dependent on plants for their food. A plant can pick carbon from the air, water and salts from the earth and nitrogen from both, and by its own wonderful power convert these inorganic elements and compounds into living or organic matter, such as starch, sugar, albuminoids, fat and vegetable acids, etc., thus forming from a few elements a vast number of organic compounds. But no animal can take these elements and build them up into flesh, blood and bone. Not a single atom of starch was ever produced, since the creation of all things, except through the cells of living plants, and so we may well agree with Playfair who said the plants are true makers of flesh; animals only sort and arrange the compounds already formed in the plants.

STOCK FEEDING TABLES.

The whole object of a discussion of the principles of stock feeding, the composition of animals and the use of food is to enable us to understand and use the stock feeding tables which have been prepared for us, and as the intelligent use of these tables is a matter of great importance to any farmer who desires to make the best use of the products of his farm, I will try to show what use these tables are, how they have been prepared and how to use them.

In the first place it makes a difference whether we are to feed oxen, sheep, cows, young cattle or horses, and secondly it is essential to know whether the oxen are working, fattening or simply standing idle with no desire on the part of the feeder to increase their flesh, or whether the cows are giving milk or not. From this it will be seen that the condition in which the animal is placed will govern the quality and quantity of the food. Remembering that food is made up of parts having different properties and these various parts produce different effects in the animal system, and it is evident that a cow giving milk not only requires more food, but food having more albuminoids from which to prepare the caseine of the milk, than a

cow not producing milk, or an ox hard at work in the lumber swamp requires different food than one fattening.

These questions then arise: What shall we feed the one and what the other? How shall the farmer know the food best adapted to the cow in milk or the cow fattening, the ox at work or the ox at rest? The feeding tables answer this for us, and while it may be true that the answers are not absolutely accurate, it is also true that there is not a farmer in Maine but might improve his method of feeding by the use of these tables, and in many instances much more might be derived from the fodder used than is now realized by the "hit or miss" method of feeding.

The day of guess work is passed in the manufacturing establishments, in engineering operations and in transportation, and it is rapidly passing away in all agricultural pursuits. Ten years ago a dairy thermometer was a curiosity in many a good dairy room, to-day the thermometer and scales are as necessary as the churn and butter workers. Exact methods are as applicable on the farm as in the factory, and the man who deceives himself by the theory that good judgment unaided by instruments of precision is sufficient for all practical work is getting distanced in the race, and the mechanical appliances are so cheap in these days that there is no excuse for being without them.

Our knowledge of stock feeding comes largely from German scientists who have made agriculture their life work. Their method of finding out the requirements of animals under various circumstances has been as follows: Suppose, for example, they wished to know the food best adapted to milk production. Cows would be selected and fed on various combinations of such fodders as the German farmers produce. After daily trials those rations which seemed to be best adapted are taken as standards and when long tests still further prove the economy of rations thus selected, the composition and digestibility of the food is determined. The usual step is to first find what is called the "maintenance ration," or ration that will just keep the animal in a healthy condition without loss of live weight.

Armsby gives the details of such an experiment carried on by Henneberg and Stohmann with an ox weighing 1,000 pounds. Several rations were fed, two of which fulfilled the requirements. One of these was made up of:

Daily.	Pounds.
Clover hay	2 6
Oat straw	14.2
Rape-cake	0.6
Water	55.0

In the United States rape-cake is uncommon but in its composition closely resembles linseed-cake, hence I have substituted linseed.

Now, knowing that this ration is sufficient to keep an animal in good health without loss of weight it becomes desirable to know what digestible nutrients it contains, and to determine this we must know the chemical composition and the per cent of digestibility of each constituent in the food. The following table shows both:

100 pounds contain		Water.	Albuminoids.	Carbo-hydrates.	Fiber.	Fat.
Clover	Total chemical composition,	14.3	11.0	41.4	25.1	1.8
	Per cent. of digestibility of each constituent.....	.....	.55	.69	.44	.56
Oat straw..	Total chemical composition,	12.5	2.3	26.4	56.0	1.0
	Per cent. of digestibility of each constituent.....	.....	.38	.43	.61	.39
	Total chemical compound ..	12 0	32.7	36.4	8.8	2.3
	Per cent. of digestibility of each constituent.....	.....	.84	.78	.....	.90

By figuring the per cent of digestibility on the total composition we get the available nutrients in the food consumed, and it is this part alone that interests the stock feeder. In the following table the digestible matter in 100 pounds of each fodder is given and it is this part that is always given in feeding tables, hence for the three foods under consideration the following is a "feeding table:"

One hundred pounds of	Albuminoids.	Carbo-hydrates plus fiberells.	Fat.
	lbs.	lbs	lbs.
Clover contains.....	6.00	39.5	1.00
Oat straw "	.87	45.5	0.30
Linseed "	27.00	28.5	2.00

From this table we can find the exact amount of digestible matter contained in the ration of hay, 2.6 pounds; straw, 14.2 pounds; and linseed .5 pounds; it is as follows:

	Albuminoids.	Carbo-hydrates plus fiber.	Fat.
	lbs.	lbs.	lbs.
Clover, 2.6, equals	0.156	1.02	0.026
Oat straw, 14.2, equals	0.123	6.45	0.042
Linseed, 0.5, equals	0.135	0.14	0.01
Total daily nutrients	0.414	7.61	0.078

The total shows the digestible matter required and the relative proportion of each constituent for the purpose of maintaining life, and the method above outlined represents the general nature of the investigation.

The advantage of knowing how much of albuminoids, carbohydrates and fat is needed daily is this: If any farm products, whether coarse fodder, grain or meat products, the above amount can be obtained, such a combination can be reasonably expected to sustain life, and therefore in selecting the kind and amount of food necessary we may rely on these tables with reasonable certainty. In other words the feeding tables are guides to good and economical feeding and when supplemented by good judgment and close observation are sure to give much better results than can be obtained by good judgment alone. No man can afford to disregard the experience of careful men who have spent a life time in search for the laws which govern animal nutrition, and any farmer who regards his own limited experience as superior to that of hundreds who have spent their whole time in pursuit of the truth, stands in his own light, because certainly no evil can result from accuracy in feeding, and the chances all favor improvement by such accuracy. Feeding tables are made up of two parts, one showing what a thousand pound animal requires per day for each of the conditions in which such an animal may be placed, and the other shows the digestible or available nutrients contained in 100 pounds of the various fodders, grains and waste products available to the farmer and feeder.

In all works on stock feeding the nutrients required are included under these heads, namely, albuminoids, carbo-hydrates including fiber, and fat; but it is well known that the value of fat in a given food is always estimated as being 2.4 times as much as that of sugar, starch and fiber, and in estimating the "nutritive ratio" of a food the fat is always multiplied by 2.4 and added to the carbo-hydrates. This being true I have found it much easier to arrange the nutrients in the feeding table under two heads, the albuminoids and carbo-hydrates plus the fat multiplied by 2.4. This gives equally accurate results and saves much perplexity in use of the tables. I have spoken of the nutritive ratio, or as Warington says, the "albuminoid ratio," and as it is a matter of some importance I will define it. It is the ratio between the albuminoids and carbo-hydrates plus the fat multiplied by 2.4. For example, in the digestible constituents of clover hay already given we find albuminoids, 6 pounds, carbo-hydrates, 39.5 pounds, and fat 1 pound. Now multiply this fat by 2.4, equals 2.4, added to carbo-hydrates (39.5) equal 41.9 pounds; or ratio is 6 of albuminoids to 41.9 carbo-hydrates, or as 1 to 7 nearly; this ratio 1 to 7 is the nutritive ratio of this sample of clover hay.

Feeding Table in Convenient Form for Use.

One thousand pounds of live weight of animal under the following conditions, requires daily:	Digestible.		Nutritive ratio.
	Albuminoids.	Carbo-hydrates plus the fat times 2.4.	
	lbs.	lbs.	
Oxen at rest	0.7	8.32	1 to 12
Oxen at work	2.4	14.4	1 to 6
Oxen fattening	3.0	16.5	1 to 5.5
Growing cattle	1.6	12.7	1 to 8
Cows giving milk	2.5	13.5	1 to 5.4
Horses at work	2.8	15.5	1 to 5.5
Horses at rest	1.8	12.6	1 to 7
Fattening swine	4.0	24.4	1 to 6
Sheep	1.2	11.2	1 to 9
Sheep fattening	3.0	16.4	1 to 5.5

This table is one that must be consulted in finding what a given animal under various circumstances needs, thus an ox in absolute rest in a warm stall needs to sustain life:

	Albuminoids. lbs.	Carbo-hydrates, etc. lbs.
An ox at work	2.4	14.4
An ox at rest	9 7	8.32

This amount is for every 1000 pounds of live weight, and in order that we may supply these nutrient materials in proper proportions, we must have a table to show the digestible matter in 100 pounds of our common fodders.

Table Showing Digestible Substance in Food, per Cwt.

One hundred pounds contain	Digestible. Albuminoids.	Digestible. Carbo-hydrates plus fat times 2.4.	Nutritive ratio.
English hay	5.8	43.4	1 : 8
Clover "	7.0	41.0	1 : 5.9
Oat straw	2.1	44.7	1 : 17
Corn fodder	3.2	45.8	1 : 14.4
Ensilage of northern corn	1.12	11.3	1 : 11
Ensilage of southern corn	.73	11.2	1 : 15.3
Corn meal	9.0	71.8	1 : 8
Corn and cob meal	7.7	70.3	1 : 9.1
Gluten meal	26.0	63.9	1 : 2.4
Linseed, new process	23.2	47.1	1 : 2
Wheat bran	12.3	51.4	1 : 4.1
Middlings	10.0	56.0	1 : 5.6
Cotton seed	35.5	47 1	1 : 1.3
Oats	9.0	54.5	1 : 6
Malt sprouts	20.8	45.8	1 : 2.2
Rye hay	6.0	50.0	1 : 8.3

Now, with these two tables any farmer may feed his stock intelligently and with a feeling of certainty that the food used is adapted to their needs and that it is not wasted. Without their use a man may feed equally well, but he has no certainty that his results are the best possible, and for this reason, if for no other, I hope that farmers into whose hands this article may fall will spend an hour extra in figuring out a ratio adapted to their work, and in comparing such a ratio with what they are to-day feeding. It cannot do any harm; it may do much good. The method of applying the tables may be best illustrated by an example: Suppose I want to feed a cow weighing 900 pounds on English hay, corn meal and cotton-seed, feeding for milk. By the table of requirements we see that a cow weighing 1,000 pounds requires 2.5 pounds albuminoids, carbo-hydrates 13.50. But our cow weighs only 900 pounds. State the matter in proportion as follows:

1,000: 900:: 2.5: 2.25 pounds albuminoids required.
1,000: 900:: 13.5: 12.15 " carbo-hydrates, etc., required.

Now, what mixture of English hay, corn meal and cotton-seed will give us the above amounts. As a rule, it is safe to start with 1½ per cent of live weight of hay, or in this case say for convenince, 12½ pounds. In the second table we find the digestible material in 100 pounds of hay and as we have taken 1-8 of a hundred pounds the figures in the table must be divided by eight.

	Albuminoids.	Carbo-hydrates.
12½ lbs. hay equal	0.72	5.82
7 " corn-cob meal equal	0.54	4.92
3 " cotton seed equal	1.06	1.41
	2.32	11.75
Required as per table	2.25	12.15

Now for all practical purposes the above is close enough to the standard and would make a valuable ration for such a cow. The same method of figuring ratios applies to all cases and is not difficult, although several trials may be necessary before the right combination is secured.

I have tried to point out the methods by which better and more rational stock-feeding is to be attained, and I shall now give a few of many rations adapted to milch cows.

Milk of itself is a highly nitrogenous product. The following will give an average of the results of analysis:

Water	87.0
Albuminoids (casein)	4.4
Fat (butter)	3.5
Carbo-hydrates (sugar)	4.5
Ash	0.6
	100

Or if we arrange this as is done in the feeding tables, we should have

	lbs.
Albuminoids	4.4
Carbo-hydrates, plus fat times 2.4	12.9

This would give a nutritive ratio of 1 to 3 nearly, hence we should expect to furnish a food comparatively rich in albuminoids.

Referring to the last article, and it will be seen that a cow giving milk requires food in which the digestible albuminoids are to the digestible non-albuminoids or carbo-hydrates, etc., as 1 to 5.4. The average cow will weigh probably not far from 900 pounds, and by the German tables it is found that such a cow would require daily the following digestible matter: Albuminoids, 2.25 pounds; carbo-hydrates, etc., 12.15 pounds. Now the question is this. Can we select average fodders from the farm in which this proportion can be obtained? In answer to this I should say it is possible, but at the same time it is more profitable to purchase some concentrated food, rich in albuminoids with which to make up the deficiency in our coarse fodders. Such foods can be obtained, for example: cotton-seed meal, linseed meal, gluten meal, wheat bran, middlings, etc.

The only farm product capable of helping the farmer out with his coarse fodder is clover hay, and in the following ration it is used:

Ration I.

	Albuminoids.	Carbo-hydrates, etc.
	lbs.	lbs.
Clover, 12½ lbs	0.88	5.1
Corn fodder, 15 lbs	0 48	6.87
Corn and cob meal, 7 lbs	0.54	4.9
	1.90	16.87

This ration is not an economical one, unless we wish to use only home-grown fodders, yet there is no doubt but such a ration will produce good results; the cost per day on such ration will, of course, depend upon the values given to the products used. Assuming values as follows: clover, $8 per ton; corn fodder, $5 per ton; corn and cob meal, $1 per cwt., and our ration costs 15¾ cents per day. We will now see how such rations might be made to conform more nearly to the requirements.

Ration II.

	Albuminoids.	Carbo-hydrates, etc.
Clover hay, 12½ lbs	0.88	5.1
Corn fodder, 15 lbs	0.48	6.87
Corn and cob meal, 2 lbs	0.15	1.40
Cotton-seed meal, 2 lbs	.61	.94
Total nutrients furnished	2.22	14.31

A ration to cost 13½ cents per day, and there is no shadow of doubt as to the relative value of the two as a milk producing food, the latter being in every way better suited to the needs of the cow. It is not yet an ideal ration, however.

Ration III.

	Pounds.	Albuminoids.	Carbo-hydrates, etc.
Clover	12½	.88	5.10
Corn fodder	10	.32	4.58
Wheat bran	4	.49	2.05
Cotton seed	1½	.53	0.70
	28	2.22	12.43

Calling wheat bran $20 per ton and this ration will cost 14½ cents per day, and in this combination we have a perfect food, according to the German standards.

Clover hay is not a common fodder to day among the New Hampshire farmers, though it ought to be. English hay is, however, a standard product New England over, and so I will enter upon the consideration of rations in which this food predominates, and by English hay is meant mixed hay of herdsgrass, red-top, June grass, etc.:

Ration IV.

	Pounds.	Albuminoids.	Carbo-hydrates, etc.
English hay	12½	.72	5.42
Oat straw	10	.21	4.47
Corn and cob meal	4	.31	2.81
Cotton seed	2½	.89	1.17
	29	2.13	13.87

Valuing hay at $10 per ton, oat straw at $5 per ton, the above ration will cost 16 cents per day.

Ration V.

	Pounds.	Albuminoids.	Carbo-hydrates, etc.
English hay	12½	.72	5.42
Corn fodder	10	.32	5.58
Wheat bran	4	.49	2.05
Gluten meal	3	.78	1.92
	29½	2.31	13.97

Corn fodder at $5 per ton and gluten meal at $26 per ton makes this ration cost 16½ cents per day.

Ration VI.

	Pounds.	Albuminoids.	Carbo-hydrates, etc.
English hay	10	.58	5.34
Corn fodder	10	.32	4.58
Straw	5	.11	2.23
Cotton seed	3½	1.24	1.64
	28½	2.25	12.79

Cost per day, 13¼ cents.

THE CULTIVATION OF THE GRASSES.

By ELBRIDGE CUSHMAN, Member of Massachusetts Board of Agriculture.

[Read at Penobscot County Institute at Brewer.]

In many of the discussions and writings of recent date upon agricultural topics where allusion has been made to the comparative value and importance of our different farm products, in most part corn has been crowned king. And while the devotees of the more genial climes pay their just homage to this imperial child of the Sun, you of northern New England would not overlook the more humble claims of the large family of grasses so essential to animal life, a family embracing a sixth part of the whole vegetable kingdom, and which has become synonymous with beef, mutton, bread and clothing and giving birth to the old proverb, "no grass no cattle, no cattle no manure, no manure no crops." What farmer can read the history of the pitiable Lot; allured by the rich and grassy plains of the valley of the Jordan, he turns away from the more sterile hills of Bethel and the wise counsels of his uncle, and pitches his tent towards Sodom. Like many a farmer of a later day he thought more of the care and feeding of his stock than of the social and moral training of his family, and had he been reared in the Pine Tree State I have no doubt he would have taken his wife and daughters and started for the western plains, sacrificing all the luxuries of life for rich pastures and cheap beef. But it is not our purpose to-day to invite you in fancy to traverse the ranches of our boundless west, or the rich pastures of the oriental world. But we would speak of the raising of hay here in your own county where you may enjoy all the advantages and rich legacies handed down by all the Uncle Abrahams and Aunt Sarahs of the west; and whether we traverse lands east or west, nowhere shall we find a clime better adapted to the cultivation of the grasses than the borders of your noble river flowing from the mountains to the sea. And while your State has been justly noted for its production and export of this valuable crop, the statistics of which are accessable to all, the practical question of the hour is, are you pushing this industry to the most profitable limit? Most certainly your annual production can be increased in a very large ratio and should you double your annual yield would it be more than could be profitably consumed within the

confines of your own State and glut the market beyond, creating a surplus and thus reducing the price below the cost of production?

In our political economy we believe that, notwithstanding unjust and unnatural laws, the place to produce the necessities of life is where nature designates and it can be done the cheapest. That there is an ever increasing demand for English hay can be proved in no better way than by a comparison of the increased production of and exportation from your State for the last ten or fifteen years. And yet the increased production has not kept pace with the increase in demand. The enormous quantities annually brought from the Provinces into the middle and southern states is truly surprising.

The highest claims offered for any of the forage plants now so strongly advocated and extensively cultivated is that they may be used as a substitute for English hay. The highly wrought pen pictures that have been drawn in the interest of ensilage and the thousands of dollars that have been spent in the construction of silos has been merely for the purpose of storing something that might extend or piece out our hay crop. So at present most certainly there is a demand for a larger supply and without doubt will be during the life-time of all present. In many parts of your State there are large and flourishing villages and cities, ever increasing in wealth and business enterprise, with a growing demand for the service of team and family horses, thus necessitating a larger and larger consumption of English hay. This is true of our whole shore line from Maine to Florida. Whence shall come the supply? Should we follow the Sun in his pathway round the world we should find him shining on no acres more productive nor on fields yielding richer returns than those upon the farms and around the homesteads of the farmers of your State. And while for the production of some of the more tender fruits and vegetables a more genial clime with longer summers may be required yours is truly a favored land for the production of English hay, cheap and abundant.

Then the next question for the practical farmer to consider is the question of profit. Can he afford to hire labor, pay interest, it may be, on his land and buildings, supply and keep in repair the necessary farm machinery and utensils, also return the plant food drawn from the soil, and still sell his product at the market price? Many farmers never give this question a moment of intelligent thought. If their barns are filled with plenty, they sell, while on the other hand if they are short they let their cattle starve it out or buy with reluctance.

I remember many years ago hearing a large farmer say that he would as soon open a vein in his arm and sell his heart's blood drop by drop, as to open his barn doors and sell out his hay crop ton by ton. At the time this seemed to me to be a very apt illustration, but experience has taught me that in order to make farming successful I must study to sell my products in the form that will yield the largest profit. In a certain sense the farmer should consider himself a manufacturer. While one may buy leather and sell shoes, and another wool and sell cloth, he buys certain elements of plant food and sells farm products, and neither one more than the other should think of producing without estimating the cost of raw material. Now, the cost of producing, harvesting, storing and marketing, every farmer can easily estimate for himself, and it will vary slightly according to circumstances, but the exhaustion of the soil, the amount of plant food actually carried away from the farm, and the cost of returning the same to produce the amount sold is a matter that, to the mind of the common farmer, is surrounded with doubts and uncertainties. However, we are told that of the dozen or more simple elements that enter into the structure of plants, all excepting three, are found almost everywhere in an abundance sufficient to supply the wants of our growing crops. While experiment often proves that one or more of these may be present in sufficient quantities for certain crops, the three wanting elements are nitrogen, potash and phosphoric acid. In the later developments of agricultural science the doctors are not all agreed that it is a wise investment for the farmers to purchase nitrogen as such and apply to their soils for the production of any special crop. So it would seem that the practical question for the farmer to decide in regard to the exhaustion of his fields in the production of the hay crop is the actual amount of potash and phosphoric acid taken out of the soil. Perhaps it may be proper here to say that in the application of the latter element in a commercial form we are compelled to apply more or less nitrogen, which, together with what accrues from the nitrifaction constantly going on in the soil, and that contained in the dews and rains and melting snows that constantly filters into the soil;—and more, if plants have the power as is held by many, and we believe on good authority, of obtaining nitrogen from the air, then it may be as well for the farmer to lay the whole subject of nitrogen on the table, for the present at least, or refer it back to the scientist.

But with the other two essential elements we have something more tangible, and the farmer can purchase these for his crops with the same assurance that he buys grain for his stock or flour for his family. So that the actual exhaustion of the soil in the production of the hay crop, and in fact most of our field crops, is in proportion to the amount of potash and phosphoric acid drawn from the soil. Then the first thing for the farmer to ascertain is how much of each of these elements is found in a ton of hay. These vary slightly under different conditions, but taking the result of several analyses I learn that there are in a ton of timothy from eight to nine pounds of phosphoric acid, worth in the market from nine to ten cents; or to make it easy to remember the producer may safely estimate the cost of this element in a ton of hay at $1.00. There will also be found from twenty-five to twenty-six pounds of potash. If this is in the form of a high grade muriate, analyzing from seventy to eighty per cent muriate of potash or fifty per cent pure potash, it will cost from four and one-half to five cents per pound; or to give a wide margin, the potash in a ton of hay cannot be reckoned more than $1.50.

Then it would seem that as far as we have absolute certain knowledge the cost of all the essential plant food taken from the soil in the production of a ton of hay is less than two dollars and a half. It must be confessed, however, that this sounds to the practical farmer a little theoretical, and too good to be true. Lest we shall be judged a theorist making an *ex parte* statement we will take into the account the cost of the nitrogen found in a ton of hay, leaving out of the calculation the manner of its getting there. We shall find thirty-one or thirty-two pounds' worth from eighteen to twenty cents per pound or in round numbers six dollars. In view of the fact that opinions of chemists and men of note take such a wide range upon the cost of the nitrogen entering into the plant structure I have been led to try experiments, in a very unsatisfactory manner, it is true and to a limited extent, on my own farm hoping thereby to throw some light on my own pathway at least. But their rehearsal would be of little value being so utterly devoid of positive results, other than to interest for the time and teach me to what a limited extent I was able to solve the mysteries of plant growth even in its lowest form. Under no circumstances did I ever realize with greater force the old couplet:

"A little learning is a dangerous thing,
Drink deep, or taste not the Pierian spring."

So I will not detain you with the many influences that have led me to the conclusion that a part at least of the nitrogen must be returned to the soil. But I am firmly of the belief that six dollars will purchase all the plant food drawn from the soil in growing a ton of hay.

In none of the operations upon the farm has the skill of the inventor rendered greater assistance to the farmer or lessened the burdens of his labors to a greater extent than in the securing of his hay crop. With our modern improvements under the most favorable conditions, it has been secured in large quantities at a cost not exceeding one dollar and fifty cents per ton, and should it cost the farmer more than three dollars per ton to secure his crop he may well believe there is something wrong in his management and a crying demand for a radical change. Good meadow land that is producing four tons annually in two crops ought to average two hundred dollars per acre in value. The interest at five per cent will be ten dollars, taxes at one per cent, two dollars. We will allow three dollars per ton for marketing which will be ample compensation where the distance is not more than eight or ten miles. Let us recapitulate:

Cost of one ton of hay,

Plant food	$6.00
Cutting, curing and storing	3 00
Interest and taxes	3 00
Marketing	3.00
Total	$15.00

For which in my county there has been a ready market at $20.00 and no doubt will be for years to come. These figures I am well aware will not strictly apply to many portions of your State, but the thinking farmer will make the application for his own particular locality. It will be seen in the case cited that $15.00 is the outlay and $5.00 the profit, or 33⅓ per cent,—a very flattering showing when 3 per cent Government bonds are eagerly snatched by greedy capitalist. Farmers of Maine, do not hesitate to invest your capital in the improvement of your grass lands. If you should fail to remember what has been said of him who will make two spears of grass grow where but one grew before, then do it with the sole object of making two dollars where you have made but one before. Why, a young man who should start in life with only fifty acres of first class meadow land under a sufficient state of cultivation

to cut only three tons per acre would be a rich young man! In fact he might be looked upon as a "young man of great expectations." Farmers, are you ready to begin little by little, year by year, to improve your grass lands to the end that you may increase your crops of English hay, and the income from your farms?

We are aware we have wandered into the *may be* and the *possibilities* of the business, and it now remains to consider the practical means of accomplishing these results. Here, as elsewhere, if the highest success is to be attained we must work in accord with Nature's laws. We must not expect to gather "grapes from thorns and figs from thistles." It is not every acre of our farm that is adapted to the growth of a large variety of our grasses. In the great family of this class individual members have their distinct characteristics, and we have learned that in the management of all living things, individualties must not be ignored. Too many farmers have but one formula in seeding up-lands and low-lands. It is all the same, hot or cold wet or dry. They might as well expect success should they feed their ducks, their chickens and their turkeys all in the same pen and on the same diet. A large proportion of our grasses luxuriate in moisture, hence find their natural home in a clayey or retentive soil. Yet standing or stagnant waters should never be allowed upon grass lands; and to guard against this much of our best and most profitable meadow lands have been under-drained. Judicious outlays in this direction are always an increasing pleasure and profit. The introduction of improved machinery has made it imperative that the fields shall be reasonably level and free from the obstructions of rocks and trees. Division walls and fences must be set wide apart that we may sweep unobstructed over broader acres.

You will pardon the digression if I say that numerous walls and fences dividing farms into small lots, as well as the old custom of fencing the road to keep the neighbors' cattle out, are hindrances to successful agriculture. They not only burden the land-holder with many cares, but materially increase the cost of every crop produced, while the last, but by no means the least objection is, they mutilate and disfigure the landscape, the outlines and beauties of which exert such a potent influence in directing the thoughts and moulding the characters of the local inhabitants.

Every farmer will classify his lands into grazing, tillage and meadow. This by no means need be an arbitrary division, many fields grow rich grasses while their surface is so uneven economy consigns them to

pasture lands. Other soils more easy of cultivation will be utilized for the production of vegetables and cereals, and the grasses will take their places, if at all, in the rotation of crops; while the true interest of the farmer may counsel that on other lands of a colder nature and harder of cultivation, hay shall be the continuous crop. It is upon such lands under the most skillful managemnt, where the largest profits are realized.

In reclaiming and draining low-lands and bogs I have had some experience. While there is no code of rules or explicit directions to be laid down that may guide in all cases, yet there are some general principals always applicable. It has been remarked that stagnant water is a deadly poison to the richer grasses. This and even spring water must be carried off either by under-drains or open ditches, and the first thing in all cases to claim attention is the outlet and fall. If these are satisfactory the work may progress. But here let me say it is rarely if ever practicable to attempt to overcome the effects of standing water by large applications of sand. In all cases whether drains are open or blind, a uniform grade or pitch from the head to the outlet of at least 6 inches to the 100 feet is desirable, and further in the end be sure and have the land thoroughly graded, that there shall be no holes or depressions where stagnant water may accumulate. If the land is hard enough to be worked with oxen there will be no need of application of sand to the surface. If not, a slight coating may be applied in winter when frozen and in the following spring grass seed may be sown with a liberal application of fine ground bone and potash. In seeding lands of this character herds grass is the farmer's main dependence. Many prefer it unmixed, especially if the hay is to be fed to horses. Herds-grass is its local New York and New England name on account of its having been first discovered growing wild in a swamp in Piscataqua, N. H., by a man by the name of Herd. Further south it is known by its true name of timothy. Like most grasses it is social in its habits and its natural companions seem to be red top, foul meadow, and meadow foxtail with others maturing at different times. The seed of these latter varieties is quite scarce and dear in the market, so for a general rule, on land adapted, we have sown one peck of timothy, one bushel of red top and ten pounds of clover, the latter always sown in the spring, for a single acre. Lands of this character properly drained, graded and seeded, with a fair return of plant food sufficient to compensate for the amount carried

off in the crop, may be mown twice annually for many years without re-seeding. It may not be profitable to continue the mowing till the wild and coarser grasses again "gain possession of the field." But when economy demands the breaking up of such lands, it should be done in the early autumn that the young grass roots may secure a firm hold before the freezing and thawing processes commence.

The production of English hay upon the poorer up-lands, the sandy plains and gravelly knolls where our fathers hoed their corn and reaped their rye, that, gentlemen, is truly another matter, and requires not only a different variety of grasses but a different treatment as well. Some may say it is not worth the trial to attempt the cultivation of the grasses upon such lands. If they are not required for the production of the hoed crops let them return to a forest growth, from whence, it may be, they were unwisely taken. In some instances this may be the wiser policy. Yet there are lands neglected on account of former abuse, that under a wise system of cultivation regain their fertility and produce not only cereals and vegetables but many varieties of our choicest grasses to a profit. Upon such lands the annual drouth falls with its greatest severity. Again, their warm and genial soils furnish an inviting breeding and feeding ground for the increase of all the insect pests so injurious to young and tender plants. So in our selections we should take only such varieties as are extremely hardy and able to withstand opposition, or that will not occupy the field until the enemy has decamped. As a rule, on such lands the later grasses are not a success. We want a combination of the earlier varieties that will start with early spring time and mature before the heat and too frequent drouths of mid-summer.

On such lands a good combination, and perhaps the best, would be orchard grass, June or Kentucky blue grass, meadow fescue and red clover, all of which mature their blossom early in June, and if the season is favorable will give a rich and luxuriant aftermarth; and even where there is a high state of fertility with this combination there will be very little danger of the grass lodging. This hay it is true would not be quite as saleable or command perhaps as high a price in the market as red top and timothy, yet experience has led us to believe that if it is cut just when the blossom is full and before the stalks have turned to woody fiber, it is devoured by dairy stock with as much relish and is fed with as good results as any hay. There is another very valuable grass extensively cultivated in my section, and I have noticed it growing by the roadside in Andros-

coggin county in your State, and in truth it may be called *the* grass of the upland portion of southern Plymouth and much of Bristol counties in Massachusetts. I think the true name is English Bent. It is known in the seed stores as Rhode Island Bent while the local misnomer throughout my section is "fine top." This is a later grass than the others mentioned and does not mature its flower and seed until the fifteenth or twentieth of July. It flowers but once during the season and when this is cut it forms a leafy aftermarth of a deep rich green much relished by grazing stock. This variety and orchard grass are perhaps without a rival in their power to withstand the severest droughts. Many sow it in connection with red clover, expecting the clover to take the lead the first year, after which it usually grows quite clear and is allowed to mature its seed which is quite as valuable as the hay. As far as possible, it is to any section all that the blue grass is to the limestone region of Kentucky. Give it but half a chance and you see exemplified the theory of the "survival of the fitest." I know of but one enemy before which it succumbs, that is the red headed grub. This insect seems to mark it for its victim. Some falls I have seen acres seared and bare, without a living spear. The best method is to turn on hogs, one or two to the acre; they will readily find the grub just below the surface, where he does his mischief, and will devour him with a relish. After the ground is thoroughly rid of the pests it may be harrowed with a wheel and scratch harrow, and reseeded with a half bushel or three pecks of seed to the acre, and if a generous application of fertilizer is made, before the close of the growing season the farmer will be led to rejoice that in this case at least, all things have worked together for good.

In regard to the time and method of seeding uplands I know there are great differences of opinion among practical men. It has been said by some that it may be done with success any day in the year. Were I to choose my time, however, it would be done as early in the fall as the season would permit, or just before the autumn rains set in. On my farm, when I have seeded in the spring with grain, failure and disappointment have been the rule, so I have adopted the practice of raising either a crop of spring rye, oats or Hungarean grass, either of which come off in time for the fall seeding. Then I sow about two bushels of rye per acre with my grass seed, thoroughly mixing both with the fertilizer to be applied, upon the barn floor, when it is sown evenly by the fertilizer spreader.

Thus I avoid the labor of sowing by hand which so few hired men can do satisfactorily. The rye is a partial production for the tender grass blades during the first winter, and if cut just before the blossom, makes a very good feed for dairy stock once per day during the early winter. Thus the rye is taken off before the extreme heat of midsummer, and in September there will be a crop of rye and grass which can be utilized as winter feed.

Ladies and gentlemen, this is a most interesting subject; we have been able only to suggest in a hurried manner a few of its leading features. We hope, however, something may have been said to provoke discussion and stimulate all to a more earnest effort towards gaining a true knowledge of our most choice and beautiful grasses. It has been truly said there are untold pleasures in store for him who shall cultivate a more intimate acquaintance with the common things that lie strewn along life's pathway. Would it not ever be a joy and a delight were we more familiar with the names and habits of the grasses that carpet our pathways, each blade being a new revelation, so beautiful to the eye. And while we contemplate their beauty and their utility we can but call to mind the lines of the poet:

"The royal rose, the tulips glow.
The jasmines' gold are fair to see,
But while the graceful grasses grow
O, gather them for me."

"The pansy's gold and purple wing,
The snowdrop's smile may light the lea,
But while the fragant grasses spring,
My wreath of them shall be."

THE DEMANDS UPON THE FARMERS OF THE FUTURE.

By ELBRIDGE CUSHMAN, Member of the Massachusetts Board of Agriculture.

[Read at Institute at Sidney.]

Not long since a friend related to me an incident of his youth. He committed to memory for declamation Webster's masterly reply to Haynes. In his room he had imagined himself to be the great defender of constitutional liberty. To him the empty chairs were the sedate Senate, and the uprorious laughter of his chums answered for applause from crowded galleries, filled with fair and eager listeners. About this time the Marshfield farmer was announced to speak at a cattle show some fourteen miles from where he was at school. When

the day arrived, with rapid and eager steps he had early made the distance. Securing a front seat he anxiously awaited with "matches and over-matches" ringing in his ears.

But lo! How were the mighty fallen that day! Mr. Webster on being introduced, in a very quiet manner and most common place style talked for a whole hour on the production of beef from nothing but salt hay and French turnips. If perchance to-day from the subject announced some may expect that a farmer, though fresh from the toils and the scenes of the fields and the farm, might be inclined to paint fancy pictures or lead you astray into the uncertain realm of prophecy, they will, like the young man, meet with disappointment, for we have no doubt but that in the future as in the past, prosperity and success in agriculture will be the result of frugality and industry guided and controlled by the highest degree of intelligence. So in the hour allotted us, we shall pass the conclusions of the theorist, and not attempt to penetrate or bring forth the secret and hidden things over which Infinite Wisdom has drawn the veil. Rather it shall be our object to show to the young men who would choose farming as a life work, and to the fathers and mothers who may cherish the fond hope that their boy will follow in the footsteps and till the farm of his father, that the demands that the future will make upon that son will require him to be a far different man from the farmer of the present. It has been truly said that we stand upon a line dividing the past from the future, and he who would gain intelligent and comprehensive views of what lies before must have trained and perfected his sight by closely observing the scenes by the wayside of the past.

But note to-day the changes constantly in progress in both the social and material world, changes wonderful, startling in their results; we contrast them with our childhood and seem to awake as from a dream. Not long since I was invited by a friend to visit his large and extensive shoe manufactory. I was shown from room to room where each man was performing his special part of the work. I was shown the newly invented machinery, I was told of its costly and delicate construction, of the skill required in its operation, of the wonderful results accomplished, the number of seconds required on an average to make a pair of shoes. I was told that each man had his specialty, and that the work was so divided and sub-divided that nearly a score of different trades were being carried on to make a shoe.

In memory I was carried back to childhood days. I seemed to see the old neighborhood shoemaker upon his bench. How well I remember every tool in his kit, from the lap-stone to the knee strap! What a change! How short the time! And in the farmhouse over the hill, how many remember the old spinning wheel that stood not in the place of ornament with gilded stripes and bands, evidencing the æsthetic tastes of those who have money to spend on "modern antiquities," but rather it stood by the "old kitchen fireplace" fit accompaniment for the loom in the open chamber. Many of us have seen our own mothers spinning and weaving the wool shorn from the flocks tended by our youthful hand. But to-day visit one of the extensive woolen manufactories in your noble State and you are led to exclaim, this is something more than progress. It is revolution. But no less wonderful and surprising shall be our visit to the fields and farm of the progressive and successful farmer of to-day. The methods and customs pursued by our fathers in their toils and labors upon the farm made deep and lasting impressions upon the memory of childhood. We will spend no time in contrasting them with the present, suffice it to say they were all in fit keeping and in most perfect harmony with the loom and the lap-stone. Indeed words might almost fail to tell the story of the changes wrought in a single span! It was the speaker's good fortune to be the son of a pretty good farmer for his day, and many would have been the long and tedious days spent toiling by his side had they not been gladdened by the many stories told of his childhood, of the methods pursued and the implements used in the agriculture of those days. He told me not only of the habits and characteristics of the men of those times, of their sports and feats of strength, but he also told me of their ploughs with wooden mould boards, their carts with wooden wheels, of their rude and heavy rakes and forks, hoes and shovels and so many other heavy and unwieldy things that it made me heartily glad that the date of my birth was postponed until the dawn of a brighter day that I might reap the benefits and rejoice in the developments of the inventive genius of the last half of the nineteenth century. But what would have been his incredulity had he been told that his boy toiling by his side would go forth in the budding spring-time upon those same acres, manuring, ploughing, harrowing and planting his fields, and instead of plodding his weary way with measured tread, would be riding the implements of culture joyfully and triumphantly. That instead of going forth to the hay

field by the light of the morning stars, horse power and newly invented machinery had taken the place of muscle formerly too often stimulated by hard cider and West India rum.

But the changes wrought in the methods of cultivation and production are no less marked and wonderful than the changes made in the demands upon the farmers themselves. Are these changes to stop here? Will there not be still greater advancements to be made in the years to come? But far be it from our purpose to speculate upon what may be the changes to be wrought by inventive genius in the future.

Well do we remember that more than a quarter of a century ago the "great agricultural editor" of the Tribune undertook to tell what were the demands of the near future upon the inventive genius of the world. He wrote a column describing in a general way some of the machines and inventions which in his opinion the world had already done without too long, not one of which as I remember has as yet made its appearance. In his "What I know of farming," Mr. Greely saw no demand for the many wonderful discoveries and scientific results achieved by patient and persistent research and investigation now carried on at our experiment stations and agricultural schools. But he did see a most urgent demand for an invention or machine rather patterned somewhat after the noblest and most wonderful specimen of God's handiwork, the human form. This ideal was to be capable of travelling at least ten miles per hour on our common roads, would stand without hitching and start without whipping, and when the farmer should have returned from mill or meeting all that would be necessary would be to unhitch from the wagon or family carriage, and attach it to the plough or cart where it must be able to perform the work of a heavy pair of draft horses. The fuel to supply the motive power in this Modern Ajax was not to cost more than ten cents per hour, and we suppose that the intention was, that it should carry enough in its pocket to last through the day.

Now the good man's fancy causes a smile, but we remember him kindly for we read his writings on agriculture for many years with much pleasure and profit, and we mention him as one "wise in many things;" and it only tends to show how useless are the speculations of even the most far-seeing in this direction. But of one thing we may rest assured, we have not outlived the inventive age. Laying aside all speculation and curiosity we may reasonably and hopefully

look for still greater and higher achievements of genius and of science in the years that are to come. So it behooves all, especially the young men, to qualify themselves in the most thorough manner to be prepared to grasp every advantage that may arise in their chosen calling.

Our fathers tilled a virgin soil, cheap in dollars but rich in nature's supplies, a soil yielding an abundant harvest with ofttimes but indifferent care. The competition of our day was a thing unknown to them. With our sons it will not be so. Telegraphic and steamboat lines are so perfected that even to-day news may be received of any scarcity or abundance in the market of our antipodes, that shall effect the price of the very next meal spread in our happy homes. The successful farmer of the future will be compelled to be wide awake, not only learning of, but anticipating these sudden changes of the market, and as many of his productions are of slow growth he who is the more discerning, and can form the better opinion of the supply and demand at their maturity, will command a decided advantage.

The idea sometimes gains possession of the minds of many boys that they will first gain a competency in some other calling for which they have no taste, and later in life enjoy the luxuries of a rural home. We never have known an instance where these day-dreams have been realized. Farming is no pastime; it is a serious business, and if conducted at a profit requires years of study and preparation, and capital invested by a novice is just as sure to melt away as dew before the rays of the morning sun. And these conditions are growing more and more intensified year by year. The farmer of the future must not only be a reading man, but he must be a *thinking* man as well. While Pilgrim's Progress and the Bible, with a monthly copy of a good Orthodox paper answered well the demands of the Puritan farmers in their early homes, he of the future will be forced to peruse both the morning and evening edition. Not only will he study what to produce to meet the demands of an uncertain and fluctuating market but he will be forced to study the most approved and scientific methods of production. It must and will be his greatest study to work in harmony with nature. He who would be successful in the future must study to thoroughly know himself, that his life work may be in perfect harmony with all his tastes and inclinations; he should know his strong points and

his weak points. In short, he should learn if possible his particular speciality, and should it lead him into the cultivation of any particular crop, he will endeavor to discover in the soil and the locality certain advantages placing him at the start a little ahead of any competitor. And further, he must know and put his knowledge in practice, that all vegetable as well as animal life is sustained by the consumption of food, by eating and drinking. We all know to-day if we but half feed ourselves and our help we must not expect remarkable feats of strength and endurance; or if we continually turn our cattle into the same scanty pasture we must not look for any interposition of Divine Providence to clothe their ribs with fatness. Yet how many there are who plow and till the same fields year after year with very little, if any, application of plant food and then bemoan the ill luck of a scanty harvest. There are potent influences operating to drive this class of farmers from the possession of the soil. To such we say farewell!

Here opens one of the broadest and most difficult questions which the New England farmer of the future will be called upon to solve, in view of sharp competition, cheap transportation and the high price of labor, speculation in plant food, together with the increasing multitudes of insect pests. Shall he sustain himself by tilling the hills and valleys of his native shores, and compete with the products of the richer and more fertile portions of the world? I always have been and am still among those who have great faith in the agricultural future of New England, and standing before you as I do to-day, a new England farmer with the experience of nearly half a century in tilling her soil, I say with all candor were I without a home and a business with a small capital at command, I would invest it in a farm, and that farm should be located, not among the fields of waving cotton and the orange groves of the sunny South, nor among the fields of rustling corn that deck the broad prairies of the fertile west, but here in New England among the homes of our fathers. Not that I expect that her rugged hillsides and rockbound shores will ever excel in the production of the great staples of life that supply and feed the nations, but that her soil will be tilled by a yeomanry capable of grasping every advantage, developing all her varied resources and producing in the highest degree of perfection crops adapted to the locality, and demanded largely by a home market. Successful cultivation of the soil will demand a higher and higher state of fertility until the best possible results shall have been

obtained. While our fathers could live on corn raised at the rate of ten bushels per acre, our sons will be compelled to raise several times that amount or raise it at a loss. And he who would be most successful will have the fullest knowledge of the composition of his soils, and of the plants to be cultivated, and this knowledge will not be gained from books alone. He will learn if he learns at all, by careful experiment in the garden and the field, nature's own laboratory. But the young man who in after years expects to meet all these demands, must qualify himself by a thorough mental training.

If possible he should avail himself of the great advantages so generously afforded him by our agricultural schools and colleges, thus fitting himself to start in life, with the advanced lines of those in his calling, and enabling him to keep in the front ranks in the march of improvement. To-day, much is known in regard to the laws governing the growth of vegetable and animal life that a quarter of a century ago was among the mysterious and hidden things, but with the philospher of old we may well exclaim that we "have gathered but a few pebbles upon the boundless shores of the great ocean of knowledge," and he who in his researches shall be content to come to a standstill, and make a stopping place of where we now are, will, in the near future, find himself far in the rear.

We know that of the twenty or more elements that enter into the composition of soils and plants all but three are found almost everywhere in an abundance, and of these three even one or all may be present in ample quantities. These three elements are articles of merchandise quoted in our prices current, bought and sold in our markets. The farmer buys them separately or in compound and feeds them to his crops. And how blindly this is done! We throw dry morsels to young and tender plants without a question, when if ever, it will reach the delicate mouths upon their little rootlets. The language is to us unknown in which we can ask them for what they are crying, and yet, we invite all ages and classes to a common diet. Little indeed do we know of the scientific feeding of ourselves and our animals, but did we not know much more about the feeding of farm stock than we do of farm crops, our horses and our cows would perish before our eyes. With our sons this need not be so. In our land there are more than a score of experimental stations working upon these very problems. The results are free to all, competition will compel the farmer of the future to know and profit by the results of these experiments. Two

of the essential elements of plant food, potash and phosphoric acid, without a question enter the plant structure in a liquid form, from the soil, through the roots, and in their application there is less chance for mistake, as they are retained in the soil until utilized. But with the other element, nitrogen, it is not so. The farmer of the future must and will know more of its office and wonderful agency in the great laboratory of nature. We know it to be the most common of all the elements around us. It puzzles us so by its shyness that we can hardly claim a common acquaintance. It enters largely into the air we breathe and the food we eat. We find it in the garments that clothe our bodies and, in fact, it enters to a large extent into our bodies themselves. The very hairs upon our heads and the nails of our fingers as well as the blood that courses through our veins are all rich in nitrogen. In its combinations it gives the beautiful green to the grasses that carpet our fair earth, to the orchards their beauty, to the forests a scenery that transports us with rapture and with joy. Yet, not one of us, perhaps, has ever seen it in its pure form, neither have we smelt, tasted or handled it. In fact we never have approached it with either of our senses. We can handle it only as we have it bound and locked in some powerful base many times its own weight. Our fathers have maintained this slight acquaintance for more than a hundred years; our sons must court a more intimate acquaintance, for we cannot grow crops without it more than we "can make bricks without straw." It would seem that legislation has done all that is possible for the farmer in this direction, compelling the manufacturer to put his guarantee of percentage of nitrogen upon each package.

Do you know this to be available plant food? Did the chemist who made the analysis know? If it came from dried blood or guano it may be such, but on the other hand if the manufacturer had worked in leather scraps, hair, scrapings of horns and hoofs, the retort of the chemist may have performed an operation upon the sample analyzed that never would have been effected by the slow processes of nature in the age of man. And further, it is a costly element. It is quoted to-day at eighteen cents per pound wholesale, irrespective of commissions. Nevertheless the farmer must buy it and apply it to his soil.

We would not say a single word to lead any one to suppose we were opposed to the use of commercial fertilizers. We believe that the foundation of all good husbandry lies in the intelligent applica-

tion of plant food in every form. Our purpose has been merely to show that the careless and indifferent way in which the farmer of the present spends his money must be supplanted by a more intelligent and scientific method. There are no monopolies in plant growth, and competition is constantly lessening the margins of profit. Failure and disappointment will be averted only by a most thorough knowledge and the highest intelligence, and this is but a case of a thousand where the successful farmer of the future will be far in advance of us to-day, and neither will his investigations stop here. He must and will advance in his knowledge of the building up of the animal structure as well. He will be forced to understand that certain elements are relished and readily assimilated at certain seasons and particular periods of the animal's life, and that at other times they are rejected and fed at a loss. Competition, if no other influence, will bring him to a recognition of the proper relations and proportions between the carbo-hydrates or heat producing elements in food, and the albuminoids or muscle forming elements, and also those forming the fatty tissue. Did one to-day possess the power to practice such knowledge to the fullest extent we have no doubt he would be enabled to produce beef at a profit in any part of New England, and without fear of competition from any source. And further, it will be required of him that he shall not only understand how to feed animals in the most economical and scientific manner, but he will more fully understand the laws controlling the breeding of such animals as are best adapted to his wants. It has been said, and I have no doubt with truth, that only about one-third of the cows kept in my State (I hope yours are better) come up to a milk producing standard that insures a profit. This should not be and he of the future who shall produce milk for a livelihood will not be slow to see that when he has two cows under similar conditions, and standing side by side, one yielding 2500 quarts per annum while the other yields not more than 1500, the poorer must be replaced by a heifer calf from the other, sired from some milk producing family of his choice. Thus we have seen that the daily routine of his business will demand ability of no mean order.

Still, there will be other higher, broader and more enobling duties demanded of the farmer of the future. In comparison with us to-day his opportunities will enable, and in fact, force him to be a man of larger understanding and broader views. He will not only have a more intimate knowledge of the laws governing the forces in the field

and among his flocks and herds, but if he would sustain as will be his privilege, the highest social position, he will better understand the development of his own individual self. With charity for all, assuming nothing, he will feel himself to be on an equal with Princes. The sun is already setting for the day in which the honest and intelligent farmer feels a social inferiority to those engaged in other callings. Less than a third of a century ago the Secretary of the Board of Agriculture of my State was criticised for making the statement that the mothers were not willing their daughters should marry farmers' sons. Already farmers' boys are on a rising market and if the city belles are not on the alert the country lasses will exhaust the supply. The farmer of the future must more fully realize that every man is being valued more and more as the periods advance by his true worth and value to the community in which he dwells. So it will be his highest aim to more fully develop every intellectual and moral faculty and in his surroundings he will be quick to see that the essential and useful must not wholly supplant the ornamental, and pleasing flowers, trees and shrubs may be cheaply cultivated and so tastefully arranged as to lend an added beauty not only to the farmer's own home but to the whole neighborhood as well. Within his dwelling the simple luxuries may be enjoyed. There is no reason why seasonable hours of well directed labor should not bring princely comforts to the farmer's home. We have seen men chained in prison, lying sick in hospitals, maimed and blinded by accident and by wars. We pitied them; but the man and woman daily chained to irksome toil, bound to passion and vice, with no eyes to see beauty by the pathways of life, staying in a cheerless abode, no greetings of welcome, the social hour spent in quarrels, who shall pity them? God pity them, and God pity the little children reared in such a place, without a home. The farmer of the future will make his abode in the truest sense a *home*. His labors will bring to himself and his family new pleasures every day. They will be health giving and life sustaining. He will be a living contradiction to the odium that has already rested too long upon his calling, "Farming don't pay."

Agriculture conducted with intelligence and sustained by capital always has and always will yield remunerative returns. The tendency of the times is for more skillful workmen, higher qualifications, better and better results in all departments. Our calling is no exception. While horse and steam power may take the place of will power, and

rods of steel and bars of iron outlast muscle and tendons, there will be no invention to supplant brain power. The great demand in the agriculture of the future will be for skilled and trusty managers. These will not be furnished to any great extent in the present generation, at least by the laborers that are constantly landing upon our shores from the old world. Scores and hundreds of positions for skilled, trained Yankee boys who have thoroughly learned the trade of farming are open to-day. They will be open in the future. But a short time since I listened to an address by one eminent in agricultural circles, in which the ground was taken that the great need of the future was more farms and more farmers, that our farms should be divided and sub-divided until we come to the theory that "Ten acres are enough." While assuming no wisdom above others and with no disposition to disparage the ownership of small homes, yet it seems to me that such a theory is in direct opposition to the tendency and teaching of the day. In almost every department of life the smaller enterprises are being overpowered by, or absorbed into the larger. Can we reasonably expect that farming is to be an exceptional business? Shall we be told that the great lessons being learned in manufactury and in trade are of no moment to the husbandman? We believe that soon indeed farmers will be compelled to rid themselves of such ideas and fully accept the fact that agriculture is a business, and is to be conducted strictly on business principles. To-day small farmers, whose circumstances and surroundings do not admit of an outlay for improved machinery, are as a rule producing at a loss, while in numerous instances accurate accounts have proved beyond a doubt that here in New England with our modern aids, common farm crops can be produced at a larger margin of profit than can be realized in manufacture or trade. Then it may well be asked why does capital hesitate to invest? And why in all our rural towns do we see so many neglected and deserted homes —homes wherein once dwelt comfort and plenty? We will not hold a discriminating tariff wholly accountable. The crying demand is for educated farmers—we use the term in its fullest significance—master workmen, men corresponding to foremen in other large industries. Do you seek a superintendent of a long line of railway, or a captain of a large ship of the line, or one to fill almost any other responsible position, scores are waiting fitted by education and training for that particular speciality. But the competent, skillful, educated farmer whose service can be secured for a salary however

inviting, is a man of the future. And we are assured that the demand for such workmen is increasing. Yet we believe that the boys are in our schools and upon our New England farms who will meet this demand. In a word we would say, boys of Maine, press forward! The field before you is broad and inviting. The goal for which you may strive is worthy your noblest efforts. As the principles of scientific agriculture are becoming better and better understood, the business is occupying a higher and higher position in the estimate of men, and we already hail with joy the dawning of the day when to be a good farmer will be an occupation second to none in our fair land.

THE DAIRY IN AGRICULTURE.

By G. M. GOWELL, Bowdoin.

Read at Institute at Strong.

Dairying is to be a most important factor in the process of placing our agriculture in a thrifty and satisfactory position. The feeding of any of the various classes of farm animals for other purposes, fails to leave with the operator so large margins of profit as are secured by feeding for the production of milk. Of course in making this statement I intend to except the feeders of thoroughbred animals who are breeding and selling stock at high prices, and the raisers of occasional horses that find markets at more than their cost of production. The statement is not intended for single animals and isolated cases, but for general application to all the stock in possession of the feeder.

Dairying is not attended with large profits. It is no short cut to wealth. The margin between cost of production and selling price is such that the closest attention must be paid to every feature of the business, and this attention must be continued by *somebody* every day in the year. Sunday chores and Sunday milking is the one distasteful feature in connection with the industry. Farmer's boys dread, and hired men are disposed to shirk it. Men work willingly throughout the week, but the milking harness of Sunday afternoon has a tendency to chafe. In its varied phases dairying requires more constant attention than most other departments of farm interests. Beef production, horse raising, and sheep husbandry are less exacting so far as labor is concerned, for the dairy

farmer goes beyond all of them. While they stop with the feeding and care of the animals he continues the work by the handling and treatment of the milk. In addition to the business of the farmer he adds that of the manufacturer.

Well, what are we going to do about it? The call of the world is for a business that will run itself without attention, and return large profits. However much we may feel disposed to accept the easier course and smoothest road, we must remember that no man can afford to do a thing when there is another thing he can as well do by which he can secure greater recompense.

We find ourselves here in possession of these Maine farms with the wants and needs of our families to provide for; and the question that is pressing itself upon each one of us for an answer is, what is the best thing for me to do?

This, I shall not attempt to answer for you individually. The fact is established that dairying is one of the best paying industries suited for general application to the majority of our farms. A phase of the question which can hardly be considered as secondary to the cash returns of the business is the facilities it affords for increasing the productiveness of the soil. If the farm is somewhat worn and the carrying of a large stock of milking cows is desired, the chief crops should be for hay and forage, leaving out the raising of grain, which should be provided by purchase. By devoting the farm to grass and forage crops which are not allowed to mature and ripen their seeds but are harvested while in bloom, the energies of the soil are not largely drawn upon. Right here is where the so-called commercial fertilizers can be made to perform their true mission and return their greatest measure of good to the cause of agriculture. By the use of the fertilizing elements offered in bone and potash, every farmer can grow a few acres of annual forage plants and secure an amount of fodder considerably greater than if he relied only upon the hay and such crops as the manurial resources of the farm could supply. There are upon most farms a few or many acres of fairly good land that are yielding but meagre crops from lack of cultivation and dearth of fertility. Plow these lands in autumn,—expose them to the freezing and bleaching processes of winter. In the spring-time after the regular crops are planted and sown, thoroughly pulverize this land. It being so late in the season but little difficulty will be experienced in making a *deep* seed bed and as *fine* as ashes. Apply five or six hundred pounds of super-phosphate the first week in June and sow

a bushel of Hungarian grass seed per acre, covering the seed only with brush harrow and roller, and with an average season the crop can be set safely at from two to two and a half tons of hay per acre. From land treated in this manner I have repeatedly harvested three tons of winter-dry hay per acre over the whole field. An average cow will eat about twenty pounds of hay per day. If we feed her from the barn during the entire year—allowing her to get nothing from the pasture—she will consume three and three-fourths tons of hay. Thus, two acres of this land in Hungarian may be safely reckoned as enough to feed a cow *well* for a year, and to spare. The land has not been impoverished by producing the crop, as the fertilizer applied was more than sufficient for its needs.

Where the manure is mostly saved, and but little bedding used, I have found two cords to be about the amount secured from each cow per year. If six acres of Hungarian can be grown in this way upon the farm each year, and there is no reason why it cannot, as the work comes at a time when other crops are in a measure laid by, then three additional cows can be fed upon the farm, returning a cash revenue to the farmer, besides which six cords of manure are secured, a quantity sufficient to fertilize well an acre of this land for seeding down to permanent grass. Thus an acre of rich land, carrying its burden of timothy, redtop and clover, is added to the area of hay land upon the farm each year.

A moderate grain ration for a cow for the year is something like this: Two quarts of wheat bran per day for the whole year; one and a half quarts of cotton seed meal and one and a half quarts of corn meal for 310 days each year; or, 700 pounds of corn meal, 700 pounds of cotton seed meal and 600 pounds of wheat bran; a total of a ton of mixed grain fed to each cow per year.

Now the manure resulting from the feeding of a ton of this mixed grain is just about twice as valuable as that from feeding the same quantity of good hay, and the ton of purchased grain fed, leaves a quantity of manure equal in value to that secured by buying and feeding two tons of hay, and the farmer who has ten cows adds as much fertilizing material to his farm by this grain feeding as though he yearly bought and fed twenty tons of timothy and redtop in addition to his own home-grown hay crop. The quantity of manure thus secured would be enough to enrich *another* acre for the permanent hay field.

Here we have a moderate farm, carrying a stock of ten cows and team that is not only holding its own in point of fertility but is add-

ing two acres of fertile soil to its productive area each year. Will not these two acres give enough timothy, redtop and clover to feed a cow throughout the year, and continue to do so in the future, being fed by having returned to them the manurial refuse of their own crops? Can not this same process with the same results be repeated each succeeding year?

Does it mean nothing to the farm, the farmer, and our agriculture, that an additional cow can be placed in the herd each year until their number equals half the number of acres of arable land in the farm? This talk is not mere theory and enthusiasm without support. We have examples in practice where these claims are supported in their fullest measure; and upon a large number of Maine farms this same problem is in process of solution with results yearly attained that go to justify the correctness of these claims.

Rightly conducted, the work of dairy farming need not be distasteful. Indeed, it is lighter than in many other departments of the farm. If every one engaged in the business would live up to the imperative rule that the work of chores and milking be completed at six o'clock in the afternoon the year around, the great stumbling block in the path of dairy farming would be removed. Do not understand me as believing in the ten-hour plan of work for the farmer, for I do not. Commence the work at whatever hour you may choose, but by all means let it cease at an early hour if you would save yourselves and those about you from discouragement.

Associating together and establishing creameries for the manufacture of butter, where a sufficient amount of patronage can be secured to make the undertaking successful, is of the utmost importance. By the creamery plan relief from much of the work of manufacturing is attained, and frequently as much money is received for the butter after the charges for making are deducted as though it was made up at home and sold by the farmer himself; the creamery having the advantage of a large stock of uniform goods of high quality to sell from, if its work has been correctly done. By skeptics, the cry for many years has been, "so many people are engaging in dairying, the business will soon be overdone and butter will not sell at living prices."

But butter has never borne so favorable prices, when compared with other articles of food, as during the last ten or fifteen years, while people in all sections have been constantly engaging in its production. The butter of a few years since by its profuse salt-

ness and rank flavors, as an article of human food, could but be regarded as a necessary evil and was eaten sparingly—simply to grease the bread. But during the last few years, since intelligence has been devoted to the production of modern butter, and it has been marketed while new, but slightly salted, waxy, firm and filled with delicious flavors, people have come to regard it as an indispensible luxury—eagerly and greedily sought for.

There can be no well grounded apprehensions for the market of the future. We must look well after quality, and keep our standard at the highest if we would hold what we have gained.

Bearing directly upon this point I will call your attention to the reported condition of "Western Creamery" butter in Boston market just at this present time. The dealers claim that all of the Western Creamery received is off in quality, and the creamery men attribute the difficulty to patrons not feeding their cows corn meal so freely as usual, owing to its unusually high price.

We have a large number of excellent dairy herds in the State. Many of them are composed of pure bred cows used for the breeding of blooded calves, and at the same time doing work as part of the machinery of butter dairying. A still greater number of herds are composed of grades of the various milking breeds, generally with the Jersey element predominating; and almost every neighborhood has a greater or less number of fine dairy cows scattered among different owners.

Although we have so many satisfactory animals among us, it is by no means an easy matter to collect a herd of good cows by purchase. In establishing a butter herd, either by purchase or breeding, the conditions that we should seek to secure in every animal are the ability to give reasonable quantities of rich milk during three hundred days each year, together with much constitutional vigor and strength. In breeding such herds I think there is no better course to pursue than to secure Jersey or Gurnsey bulls that are from families of deep, rich butter makers.

I would insist most emphatically that their near female relatives be able to yield from three to four hundred pounds of butter per year with moderate treatment, and that the color, quality of skin and ear be of the highest order. These bulls, bred with common or grade cows of any neighborhood where the stock is already of a fair quality, will furnish heifers adapted to the butter dairy; and a continuation of this course with the succeeding generation of heifers,

grading up to quarters, eighths, sixteenths and higher, of pure blood, will furnish dairy stock of the highest order and perfectly adapted to the performance of the special work for which they are bred. Shorthorn, Herefords and other heavy flesh producing breeds, each and all have claims of varying degrees of justness of their ability to grow beef with rapidity, economy and of high quality. The qualifications of these breeds in these directions are worthy the pride of their champions. Their purpose is a special one, and in creating the functions for perfect beef production, everything else was made subservient, or at least of secondary importance in their breeding.

No one, however enthusiastic he may be, can expect ever to see a breed of animals established, possessing the facilities for the production of both beef and butter in satisfying degrees of quantity and quality.

Ayrshires and Holsteins are heavy milkers and occasional cows yield large amounts of butter, but as classes they cannot be considered as entitled to high positions as butter cows.

Take the Jerseys and Gurnseys for what they have become. Take them for what they are—classes of animals having the peculiarities of extracting from the food they eat, milk, cream and butter of a higher degree of excellence than any other class of animals is capable of doing. Their breeding for more than a century has been in this especial direction, and these peculiarities have become fixed upon them, together with the power of their transmittal. Among them are to be found poor and inferior animals, as there are in all breeds, but I am speaking of them as classes. Why should we continue the war of breeds? Other generations of breeders originated, shaped and developed them, each for a definite and special purpose. The condition of the agricultural interests of the older portions of the State to-day are such as to call from every person interested in the general prosperity of the people, expressions of the utmost solicitude. I am not insensible to the fact that there are sections of territory—consisting of one or several farms or neighborhoods, or, in some instances, nearly whole towns, where the business of agriculture is prosperous, paying, booming. But by far the larger number of our farms, while paying no dividends are losing in quality and value each year. The causes which have led to these wide differences of poverty or prosperity are not to be attributed to the natural strength or weakness of the soils, or to favors in location. Methods pursued have had much to do with the conditions now existing.

The thoughts aroused and impressions received from our observations, as we pass these depleted and sparsely peopled farms, are not of a pleasant kind. The fallen stones from tottering walls, that in earlier years were evened up each spring, are now from lack of working force allowed to assume the condition of ruins. The brier grown fence rows, the alders creeping on to the grass lands from the banks of the brook in the meadow, the wild cherry bushes springing up around the stumps where occasionally old apple trees have died in the orchard, the worn exterior of house and barns and the sag-roofed shed, speak to us in language silent yet all their own, and calling out exultingly: "The victory is ours, we are going back to nature. Our acres were assailed in the long gone past. Our forests, our native products, were torn from us and destroyed. We were subjugated and plowed and harrowed and made to bring forth the plants which man desired in place of our own. He builded houses and barns and fences from our trees and stones. He planted artificial orchards of apple trees where he had destroyed our maples and birches and oaks. For years the battle was all against us. Whenever we sought to reassert ourselves we were quickly quelled. Wherever in fence corner or nook we sent up a shoot of alder or willow or birch, it was ruthlessly torn out. In our helplessness we made our enemy fat, and man reared his children and clothed and fed them upon our bounty. He extracted from us our virgin strength and sent it to market, and treated us as though he could continue the process forever. Instead of husbanding and returning to us the fertilizing elements that would have resulted from the feeding of our products to animals here, he allowed them to become dissipated and lost.

After years of such treatment, we became tired and worn and largely exhausted of our strength. The crops which we were able to give became meagre and scanty. The farmer's family was forced to live in a simpler manner, and complaints became common that farming was a hard life and did not pay. Long ago the young folks left it and for years only the old people have been here to run the farm, aided occasionally by some inefficient man who could be hired at a low price.

And now weak and worn though we are, by long years of toil and abuse, we are gaining courage. The war against us has almost ceased and we shall soon be able to reassert ourselves. We are throwing up alders and willows in the pasture and meadow. We

are overthrowing the fences, filling the fence rows and roadsides with briers and bushes, and pulling down the buildings; and there is no one here to restrain us. The victory is ours—we are going back to the primeval."

Now it is not my intention to speak to-day of methods of renovation or restoration of old farms where the process of depletion is so complete. There is a condition of farm property occasionally to be found where the process of renovation would be costly; where the expense would be greater than the future value of the reclaimed property would warrant. Farm operations must be considered as business transactions. No one can afford to invest even his own labor in an enterprise, however enthusiastic in its behalf he may be, unless he is reasonably sure of his pay therefor.

But I wish to speak with reference to that large area of our State, where the conditions are favorable to grass growing and cattle husbandry, but where this same process of devastation with which you are but too familiar is going on; where year by year the farm produces gradually diminishing crops, and year by year its cattle-feeding capacity is growing less; and the herds and flocks have been reduced in numbers to correspond to the shrunken mows and bins in the old barns.

To these farms modern dairying offers processes, by the adoption of which a higher state of fertility and greater productiveness may be secured, and a correspondingly increased revenue realized by the owner. That our conditions are most favorable for this work is evident. Grass is the natural product of our soil. It is the great crop which we can produce in perfection. Nowhere else have I seen such firm, even sward as in New England.

The springs of the valleys and hillsides, the cool brooks and streams that come down to us from their sources among the hills and mountains all the way through the woods of Northern Maine, bring to us pure, health giving water uncontaminated by flowing through a thickly peopled country. Our cool, moist climate is in marked contrast with that of States to the south of us. This is a most important consideration and one of the greatest weight when we remember the tendency to weakness and disease that prevails among the kine during the hot, dry seasons of less favored localities.

People of all the country have learned the fact that our State has the most delightful and health-giving climate in the world. If this is true of *man*, why not of *beast*?

View this question in whatever light we may, examine it from every standpoint, and there is no cause to doubt if butter dairying was adopted and applied to all the farms in Maine, where the opportunities and conditions are favorable, that a far greater degree of prosperity would result to the farmers, the community and the entire State than has ever yet prevailed. Increase the capacity of the farms; make weak ones strong by giving back to the soil the plant food that has been extracted and lost; and stop not until a condition of fertility prevails equal to that which our fathers found when they had stripped and burned the forest growth, and harvested the crops which a virgin soil yielded.

Then with increased resources, larger net revenues would result and the business of agriculture would take its place as one of the profitable vocations of our State. When this condition is secured that other question of the retention upon the farms of our sons and daughters, our native population, will be solved. Then our young men, the courage and buoyancy of the people, will have an opportunity of engaging at or near the old home in a business to which they were bred, with the prospect of reasonable recompense, and the benefits that accrue to a higher civilization.

COMPENSATION OF FARM LIFE.

By A. I. Brown, Belfast.

[Given at Institutes at Turner and Springvale.]

It is a common notion among us that mankind was doomed to labor on account of the original transgression, and that the necessity for earning the food which we eat is the most galling, and only punitive part of the sentence imposed on the descendants of Adam. With very many people this notion has settled into conviction, and the main and only really earnest purpose of their lives seems to be to devise means to escape their part of the penalty. Too often, now-a-days, boys and girls have it instilled into their minds that they are to work for a living only as a last resort; and the human race has got to have such immense confidence in itself that it seldom admits, without trial, but that the wits will be able to take care of the

body somehow. So, when obliged to depend upon the muscles at last, the wits never having had any sympathy with the muscles, it is some time before they get on well together; and between the two the poor body has a rather hard time of it. If it is not entirely worn out before a sympathy is awakened, we shall see then the beginning of what the nineteenth century calls success.

This notion is all wrong. Whether people in Old Testament times found out the error does not matter. But it is certain that Paul had solved the philosophy of work, because in writing to the church at Thessalonica he says: "For we hear that there are some which walk among you disorderly, working not at all. Now, them that are such we command and exhort, by our Lord Jesus Christ, that with quietness they work and eat their own bread." To-day, everybody who has read or thought intelligently on the subject knows that whatever progress the world has made in civilization is due to labor. The history of nations shows that so long as the people were workers there was progress and improvement. Work, then, is valuable to man, not alone for its material recompense, but in the fact that it keeps him out of mischief. Search history, trace the rise and fall of nations—these facts stand out in unmistakable characters. "When wealth accumulates then men decay," "Idleness has ever been the mother of vice." Nor are examples wanting in modern times. In tropical lands, where the necessities of life are few, where endless summer abides and man has had but to pluck and eat, no native type of high civilization has ever been found developed or evolved. In the country of perpetual flowers even the busy bee becomes a vagabond. Take away the necessity for labor, and this would become a generation of idlers—the next, a generation of criminals. Work, then, is not a curse. Those who regard it as an evil, must concede that, at least, it is a necessary one, while those who look upon it in the light of reason and philosophy have long since come to recognize it as a boon to man, a blessing to communities, ennobling to the human race. There is to-day much—there always has been some—discontent among workers. It is not our purpose to discuss all the causes. There is one feature, however, which unlike many of the others, always has existed and probably always will exist. At this we wish to glance.

It has no solid foundation either in reason or common sense. "John, who most likely will have to go on foot anyhow, is unhappy

because Thomas has a horse." This is the way a modern writer puts it. But the Lord condemned that sort of sin when he spoke from Mount Sinai with most refreshing vigor, no doubt as much needed then as now, "Thou shalt not covet thy neighbor's house, &c." Go to work and earn and save the wherewithall to build one of thine own is what we infer was in his mind, but it is not recorded that he said so. We must not forget that an earnest endeavor to better one's condition is an honorable incentive to action and a most worthy aim. It is more than these; it is a duty to one's self and to the State. The question with us ought to be, in what way, if labor is our stepping stone, can we rise highest in the true sense of worldly elevation? It is no use to spend time lamenting because John must walk. Better by far inquire about the different roads. Into what country do they lead? Do they lie in pleasant places? Are they steep and hard? Are there chasms to cross, rivers to ford, sloughs to bridge? Are there quicksands? And above all, where will they end? Will there, can there be rest in old age? Then let us choose the path, and with willing feet, stout staff and stouter heart set out on life's pilgrimage.

We are now face to face with the question which we wish to present, which is a comparison of agriculture with other laborious callings, starting out with the proposition that the farmers of to-day are and the farmers of the future will be, for the most part, men and women *obliged to work*, in some way, if they get an honest living. A comparison between this toiling majority and a more independent or a wealthy class is not a fair one, and is the cause of much individual unhappiness, and much of the so called class prejudice.

However unpleasant the fact may be that the most of us must work, we must finally accept it and make the best of it. That the best is on the farm seems to be so patent that proof is hardly needed, yet it can do no harm to review the evidence in the case. Labor uncompensated is slavery. Free labor, or rather the labor of a free man is compensated: first, by money or its equivalent; second, by the pride, pleasure, or satisfaction which comes to all who love their calling and are enabled to excel; third, by nature, in various ways, sometimes unnoticed, often unrealized. Let us glance at these. To arrive at any sensible conclusion it will always be necessary to recognize and keep in view the fact that fair comparisons must be made. If one man hires out on a farm, and another

to do some other kind of manual labor, with equal health, industry, frugality, and ability to be useful, they will accumulate about the same sums of money, as a rule, because the laws of supply and demand regulate such matters. If a farmer be lazy, he should be compared with some other lazy man. Both will make a failure in life to be sure, but the farmer may live like a king, in summer time, while the other will starve all the year through. If the farm be rocky and the soil poor, he who tills it should be compared with some other man who is badly located. When a man leaves a trade or enters upon a life work, it is usually because he has a liking for it. When such a man is compared with a farmer, he too should have a liking for his business. A man owning a farm worth $1500, and owning his stock and tools may be compared with a blacksmith or other artisan owning a house, shop, tools, and so on.

The support of a family on a farm, being fed almost entirely as they may be, and clothed in part as they are, from the products of the farm, does not require so much cash as is needed to support a family of the same size, in the same style, elsewhere. If the farmer handles less money than other classes in general, he has less need to handle it. I present here a schedule of a few of the staple articles raised on the farm, that come instead of money into the farmer's earnings. I think the cost has been put low, it being my object to illustrate, not to mislead. The family is supposed to consist of six persons, and retail prices are reckoned.

2 quarts milk per day—5 cents	$36 50
4 pounds butter per week—25 cents	52 00
60 dozen eggs—15 cents	9 00
Meats	90 00
Fuel	30 00
Stockings and mittens	15 00
Beans	6 00
Potatoes	7 00
Other vegetables	12 00
Berries, canned goods, &c	15 00
6 barrels flour	32 00
6 " apples	10 00
	$314 50

These are the principal staple items. There are numerous sundries such as cheese, meal, lard, etc., that may be added. I pre-

sume that these and a reasonable sum, say $15 for the use of the family horse, for pleasure riding, which is a legitimate item in the cost of living in any family, would swell these figures to $350. Let the farm produce this and much more;—then the receipts in money and its equivalent are above those of the average worker in other industrial pursuits. In fact the figures call for 300 days' labor in the year at $2\frac{1}{3}$ per day. Few earn this. Those who do as well are far outnumbered by farmers who do better. Other estimates for families either larger or smaller show to the advantage of the farm. I think after close study of the subject that, when fair comparisons are made, in no place is labor so well paid as on the farm. If the farmer can show even as good a balance sheet as *any* thus far, his other indirect cash compensations are so many and so great that the case is plain.

The first and best of these indirect compensations is the home, which we will consider first in a pecuniary, and in another division of this subject in a moral sense. A laborer, no matter whether he be a "hewer of wood and a drawer of water," or whether he be an artisan working at any of the various trades or avocations, can never feel that he has a settled abode. There are no communities in New England worth mentioning, much less worth living in, where the weekly and often the daily papers do not come; knowledge of what is going on all over the world is now common property. Where labor is well paid to-day, to-morrow the cars or steamboat may unload a horde of men to cheapen wages. Hence the man who, at the bench or anvil, has acquired a small capital cannot in these days safely settle himself in a home of his own.

In 1880 copper was worth twenty-five cents per pound. In 1886 the price went as low as nine and a half cents per pound. The Montana Copper Company which put out 8,000,000 pounds of copper annually, was forced to suspend operations. Thousands of men in this and other copper mines were thrown out of employment, and hundreds of families became wanderers. Home restraints were lost. Home instincts were weakened. Discouragement usurped the throne of peace. Crime suggested a means to baffle hunger. Manhood lost an ally. Depravity seized its victims.

The same is true of other trades and callings. Depressions in business, strikes and other causes are enacting the same scenes all over the land. True, farm products are depressed in value, but just here is a point that must not be forgotten, because it is one of

the special compensations of agriculture. Five bushels of wheat will still make a barrel of flour, and a barrel of flour will make just as many cakes as it used to do. The cattle and sheep thrive and grow fat in the good old way. Their flesh is just as tender and the wool is just as warm as of old. Copper, iron, coal, shoes, will not appease hunger, the products of the farm will.

Another pecuniary compensation comes in sickness. Let the wage-worker be stretched upon a sick bed and the income ceases. The farmer finds his somewhat diminished but not destroyed. At death the former leaves a set of well worn tools to untaught hands ; no fields of growing grain or waving grass, or store of winter food shut up in earth or bin. With him the business itself dies. Sickness drains the purse. Health and prosperity, smiling, go hand in hand. Go to any of our summer resorts, to the seashore, to the mountains—go anywhere, we cannot fail to note that avocation has much to do with health. With pure air, good water, wholesome food and plenty of it, no class is so healthy as the farmer. This compensation is seen more plainly in the children of the country than in the adult population. Look at the sturdy boys and girls as they trudge along our highways to the country school. Admire the robust health that is almost universal. Compare them with the children of those who work in our large towns and cities, puny, pale and listless. What is the value of health? Go ask a council of physicians. Go ask the invalid.

In all branches of business, chances of failure are to be considered. Very few men accomplish what they expect. A partial failure may come to the best. A total failure, always to be deplored, seldom comes to the tiller of the soil. To every man there comes a time when he is at his best, when his handiwork shows the summit of his skill. The expert farmer in common with all others receives the extra compensation always accorded to skilled labor, and has the additional recompense of seeing his acres becoming more valuable under his hands.

Education costs money, and time, which Franklin says is money. It is not confined to the schools. Every man or woman in any calling needs that education which is only accquired by observation and thought, fortified by reading and experiment. In these progressive times the need of such education is more urgent and apparent every year. Here, too, the farm has decided and special advantages. Its atmosphere, particularly during the winter months,

gives that quiet and serenity of mind so necessary to mental growth. In addition to this there is then a season of comparative leisure with no seductive temptations to induce a waste of time. There are those who sneer at the intellectual development of farmers, yet we and they recognize the fact that the character of a people is moulded by their intelligence and that brains are one of the most valuable products of the State of Maine. And nowhere do they thrive with greater vigor or make a more substantial growth than on the farm.

All who labor need recreation. Happily it is more indulged in than formerly. It is the manifest plan of Nature that recreation demands change of scene and surroundings. The mountaineer instinctively turns to the valley, his lowland neighbor to the mountain. The countryman, the city dweller, the professional man, the business man, the clerk, the journeyman, the farmer—all, seek quiet rest amid the scenes of nature. In the vacation season the cities are almost deserted. With the pilgrimages of the wealthy we have nothing to do. But let us follow one of the great middle class, not farmers, during a brief fortnight's vacation, compare their expenses with ours and strike the balance. Their car-fare, steamboat-fare and horse hire, absorb the earnings of a month or two. Being obliged to crowd the recreation of a year into two short weeks, no rest and little pleasure can be had. *We* drive our own horse if we are wise. We choose our time of setting out and our season of returning. Our salaries are not made less by reason of our absence. I am glad to note that many of our farmers, with their wives, are making extended tours with their own teams in various directions over our own State, becoming better acquainted with its beautiful scenery, its resources and its people. Time and money thus spent are well spent. We not only enjoy recreation of the best sort, but we add to our knowledge skill and faith by observation. But there is compensation in another sort of recreation. I mean that of the family and of the neighborhood in every day life. These should be of the right sort. Nowhere are they so pure and so much under control as in the country. There are few temptations and public opinion always sustains the enforcement of the laws.

Having thus briefly outlined this division of the subject—briefly because the facts are so obvious, let us pass to other considerations. We are our own masters. All other men are dependent upon somebody, in some way. Human nature rebels against individual re-

straint. The right to plan and execute for one's self is the acme and ideal of personal freedom. Father Time is the most unfeeling and inexorable of all task masters. The farmer of all laborers is able to disregard his mandates. The clanging bell and shrieking whistle fall unheeded on his ear. * * * * *

We have spoken above of the pecuniary value of the farmer's abode. We will now allude to it under this head of our subject, home. This is sweetest and best of all compensations which labor brings us. The pride of its possession, the sense of security which we feel repay us as no glittering gold can do. The farmer feels this security. He has this independence. The coming of one man or of a hundred men is no misfortune. His own roof is over his head. His own herds delight his eye. His own acres yield him food. He may plant a rose and wait in faith to see it bloom.

He may add adornments of any sort knowing they may remain to him and his. No depressions in business, no panics need make him a wanderer. He is settled and secure. Beyond all other blessings which a country life affords is the farmer's home. Not unlike city homes in domestic cares. Not unlike any homes in routine work, in joys and sorrows. But, the trees that wave above our heads belong to us. We have no need to cry, "Woodman spare that tree!" They are all our own. The hills and the flocks which there do crop luxuriant verdure are almost a part of ourselves. The valleys with their burden of grass and grain are to us as our right hand. The orchard where the children play and eat their fill of delicious fruit we cherish. The laughing brook where the cattle come to drink, the joyous singing birds, springing from bough to bough above our heads, the wind dancing a minuet through the tasselled corn, are the melodies of Nature's music in our ears. In city homes, love abounds as it does in ours; but the pictures they enjoy are copies. We have the originals. Their birds are tamed and hang in gilded cages, ours are free and fresh from the hand of God who made them. The fruit which they partake is stale and from afar. It is ours to pluck and brush away the pristine dainty blush and eat the perfect gifts of Nature beneath our own, the trees and vines that bore them. The water springing from the ledges, dancing down the hillside, glancing through the sunny meadows, is brought to us through natural aqueducts, a "healthful beverage." The air we breathe, pure as the atmosphere of Heaven, bears health upon its wings.

The sun rises and sets for the farmer. Thankful should we be that life has a field for us where duty is so urgent as to call us forth to look upon a summer sunrise. More thankful still, that to our eyes are given sufficient breadths of horizon to see him sink behind the cloud curtains of the western skies.

In considering the value of a home, present comfort and attractions are not all that are to be considered. The home influences should be pure. These influences are to affect the whole lives of the children —of the world for all coming time. But, however wholesome the moral atmosphere in the family circle may be, the surroundings are of almost equal importance. In crowded tenements the air is reeking with moral poison. To go out of doors, even from quiet houses in our large towns is to go into the street to be jostled by the rabble.

Farm life sustains home teaching and home influences. As we leave the farm temptations gather and vice allures. The road to a city is beset with danger. "In fair virtue's heavenly road the cottage leaves the palace far behind." American cities are continually growing more corrupt. Farming communities are ever growing better. Who shall estimate the value of an opportunity of building up a good character, of training up a child. A good character to a person starting out in life is of untold value. What sweeter recompense can parents feel than to see their children growing into a noble manhood and womanhood, with good habits, noble aspirations and strict integrity.

The ownership of land has always been the pride of man. For it men have penetrated the forest, suffered privation, toiled. They have torn themselves from kindred and sought a distant shore. War has been invoked, and millions have toiled in trenches, sickened in marshes, gone maimed on crutches, poured out their life blood in battles, that they might leave the soil a free inheritance to posterity. After the sword comes the plow. The man who owns and tills the land becomes a better citizen, having not only the common interest of personal security, but he feels that a part of the country itself is his. Farm life is thus a character builder, primarily to the individual, secondarily to the State.

The patriotic citizen notes with pride that we are in pursuit of our peaceful calling, slowly but surely building up the Nation's character, and its natural advantages have made the farm the fortress of the Nation's safety. Around its bastions the strife of speculative greed, and party rancor must surge and roar in vain. * * *

There is also an æsthetic view of the question—who shall estimate the value of the beautiful? Echoing in the streets of a still slumbering city I hear the footsteps of a workman hurrying to the mill. Through the heavy smoke-laden air he sees high walls of cold gray stone and dull red brick on either side. An iron gate clangs behind him as he enters a cavernous door way to toil all day in sultry air and flying dust. No sun, no sky, no birds, no flowers, no change, no respite. What wonder that his soul recoils upon itself, and that discontent broods o'er him like a specter. Shut in forever from the beautiful he can never lift himself to moral heights.

One picture more and the ledger will close, the balance will be struck. Just beyond the suburbs of the city there is a quiet road, which, if you follow it far, will take you to a bridge which spans a narrow stream. In early springtime and even in late autumn it is a wild and noisy stream, rushing madly over the ruins of a mill-dam, and beating itself into foam upon the ledges. But in summer time the rocks lie bare but for the fragrant mint, and pale green celandine with amber colored stalks which take root among the pebbles. With the wild vines festooning the alders on the banks, the golden-rod peeping over the broken and mossy railing, the grateful shade, and the sweet stillness—it is a delightful picture of nature in repose. Into the open spaces the sun throws down his yellow light in slanting rays, through the incense-laden air. Is this soft haze the diffused fragrance of the flowers? Is this balmy air mellowed by the hum of insect and the song of birds? It is yet too early in the season for the leaves to change their color. Still, there are pretty contrasts in the varying shades of green, in the hemlock, spruce and fir, the maple, beech and alder. There are dainty bits of color, too, clusters of choke-cherries are just turning from green and yellow to rich, dark purple. Those on the upper branches are dusky already in the sunlight. Low down, half hidden by the tall beeches the moose-wood holds its oriental leaf over pink-cheeked berries. The clematis is coming into bloom. Its masses of white petals are swinging on many a bough.

The stately queen of the meadow raises her regal crown of flowers above the boulders, or turns to see her image in the clear surface of a spring where robins, sparrows, blue-birds—all the feathered inhabitants of the forests come to sip and bathe.

A sleek, gentle looking horse, tethered by the wayside, is contentedly cropping the tall green herbage. Upon the grass, where

shadows fall, sits a lady reading from a book which lies open before her. Stretched at her feet is her husband. The tan upon his cheeks, a slight stoop in the shoulders, his sunburned, calloused hands show that he is a farmer. At length the sun sinks low towards the horizon. "The cows will be waiting at the gate; it is time to go," she tells him. Half way up the hill she turns to look once more upon the peaceful scene, and they go their way along the quiet road to where their cottage home awaits them.

IS THOROUGHBRED STOCK ESSENTIAL TO GOOD FARMING?

By E. J. GILKEY, Member for Franklin County.

[Delivered at the Farmer's Institute at Rangley.]

Ladies and gentlemen:—We have come together to-day for the purpose of discussing the various arts of farming. It is with feelings of diffidence that I come before you with the idea of giving any instruction or knowledge on this important subject. I will therefore merely open the door for more able speakers. Although raised on the farm, I cannot be called a practical farmer of to-day. But let me say here that the happiest years of my life were spent on the farm, clearing land, raising stock and grain, and looking forward to a glad future. Since leaving the farm I have taken great interest in stock raising of all kinds, and have always been identified with the work of agricultural societies.

The cultivation of the earth is the most important labor of man. Man may be civilized, in some degree, without great progress in the manufacturing arts; but without the cultivation of the earth, an employment to which God assigned him, he is in all countries a savage still. The farmers are, therefore, the founders of human civilization. All interests depend upon the prosperity and success of agriculture; and no man is so high as to be independent of the success of this great interest, nor so low as not to be affected by its prosperity or decline; when the farmers are prosperous, mechanics, merchants, manufacturers and professional men, all alike rejoice in a common prosperity. No country or nation can prosper while her agriculture is in a languishing condition. By common consent the farmer is placed at the head of all producers.

Inseparably connected with the tillage of the soil is the breeding and rearing of domestic animals. It requires more general knowl-

edge, I believe, to be a successful agriculturist and stock breeder than any other occupation or profession in life. The Governor of one of the Middle States when called upon to speak before an agricultural convention, not only boasted of having been a boy once, but that he was raised upon a farm, and expressed regret that he ever left that high and noble calling. It is evident that the whole influence of farm life is elevating and ennobling. The spirit that is cultivated amongst trees, fruits, waving grain, and by intelligent care of domestic animals, is very different from what is learned or cultivated on the streets of the city or in the bar-rooms. And it is a fact that the advantages are in favor of a thorough education for a farm life, whether from a mental or moral aspect. A few years ago, in conversation with one of the prominent farmers of Franklin county, also a member of one of the agricultural societies of the county, he said, "My success in farm life I owe to the competition with my neighbors in raising thoroughbred stock and the best crops." For several years his son has presented at our county fairs one of the best herds on the field, and I think has taken premiums at the State fairs. A large majority of the most useful men in the councils of our nation, as well as in other callings, owe their success to their early training on the farm. So we may go on, and you will find that the greatest and best men of our country were once farmers. And it was their boasted pride to have the best stock and to raise the best crops, and have everything about their farm buildings looking neat and tidy.

It was but a few years ago when oxen that measured seven and a half feet or seven feet were considered large and brought fabulous prices, say from eighty dollars to one hundred dollars possibly one hundred twenty-five dollars. Occasionally we could learn of a pair being up to eight feet; they were monsters, and were visited from far and near. Now it is not uncommon to see oxen that will measure from eight feet three inches to eight feet ten or eleven inches, bringing from two hundred to four hundred dollars, and I think still higher for imported or some fancy stock. So much for competition and the raising of thoroughbred stock, for without this competition and pride of having the best, we should be where our fathers were, raising little scrub cattle.

The general condition of agriculture throughout the country is certainly improving, and closely allied to this interest, as already remarked, is stock breeding; and the decided improvement in do-

mestic animals of the State and country, no doubt is due to the annual exhibition of the State and County agricultural societies. The improvement of our useful domestic animals is a subject that cannot be too forcibly urged upon the farmers of the country. It is certain a man may just as well have good stock as that of a poor grade. The same land that will keep poor animals will maintain an equal number of good ones. No more labor is required to care for one than the other, if both are cared for as they should be, while the annual profits from the sale of good stock are much greater than those of the poor. This is eminently the case with cattle, and holds good with sheep and swine. Our farmers generally understand this and are rapidly improving their domestic animals. From every point that this subject can be viewed or examined, the benefits resulting from keeping good stock become more apparent, and more fully confirm the fact that the best is the cheapest. This has been largely brought about through the kindness of the owners. When I was a boy it was no uncommon thing to see men, or rather brutes, shamefully abusing their cattle and horses because they did not work better, or just as they wanted, when the animals were really doing more for their owners than they deserved. How different to-day. It is kindness from both men and boys that puts the fat upon the oxen, brings out the work, and puts on the big prices. Therefore, every farmer who expects or desires to succeed, should see to it that he has the best thoroughbred stock, for without such I contend no farmer will succeed in this day of farm improvement. Now, as I said in the beginning, I am not competent for the proper treatment of this subject in its broadest field, and I may well leave it in more able hands for its further unfolding.

TWELVE YEARS OF AGRICULTURAL EXPERIMENT STATIONS IN THE UNITED STATES.

By Prof. W. O. ATWATER.

From Report Connecticut Board of Agriculture, 1887.—By Permission.

Mr. President, Ladies and Gentlemen:

To those of you who were present at the meeting of this board in Meriden just fourteen years ago, when the movement was started which resulted, two years later, in the organization, in Connecticut, of the first agricultural experiment station in America; to the larger number of you who, though not present at that meeting have followed the movement from its inception; indeed to all who are interested in the continued advancement of the oldest of all arts by newest discoveries of science, it would seem strange if in the review of the subject assigned me, I did not bring before you many things to suggest grateful congratulations for the past and high inspiration for the future. And while it has been a sincere pleasure to me, as chemist, from time to time to recount in these meetings some of the ways in which one branch of my science might be made useful to your practice, the pleasantest part has been in the hearty response you have always given to the sentiment, that after all the highest usefulness of science is not mainly in the increased product of the soil or profit to the pocket which its application brings, but rather in the better thinking and worthier living to which these are a necessary help. So, when we recall that the twelve years just past form really the first epoch of the history of the experiment station in America, and that the second is just being ushered in by the provision of the National Congress for the establishment of an experiment station in every State and Territory in the Union, I feel certain that you will approve rather than chide if I ask you to look upon the intellectual as well as the more practical aspects of the subject. The Connecticut farmer and the college professor have always been on the best of terms. The Connecticut Experiment Station was first started in a college laboratory; its directors have both been college instructors. Neither one of them, I believe, has ever had occasion to feel that the best sentiment of the State did not approve, indeed, did not ask for his best intellectual work. The farmers have felt that their best interests would be most effectively furthered by the highest science.

Experiment stations are for the benefit of agriculture. Yet paradoxical as it may seem, the bulk of the knowledge, the most of the facts and principles which they need to find out for the farm require for their discovery not only the same spirit of investigation, but essentially the same methods of research as are followed in all the higher works of science. Physical science has no profounder problems than are involved in the culture of the soil, the nutrition of plants, and the breeding and feeding of animals. If there is one art above another which requires for its successful conduct the application of the most diversified physical law it is the art of farming.

But to my subject. The history of the experiment station of Connecticut is a part of the larger history of the stations of the United States; and those, a part of the still larger history of the stations of the old world and the new together. Not only because it is of interest to us now to recall our experience with our own station, but because there are lessons to be learned from the past for future conduct of stations in Connecticut and every other State, does a brief reference to the early history of experiment stations seem appropriate.

A little over thirty years ago, in the year 1851, a company of farmers in the little kingdom of Saxony got together and established, on a farm near the village of Moeckern, just outside the city of Leipsic, a chemical laboratory. For years before, indeed, Liebig in Germany, Boussingault in France, Lawes and Gilbert in England, and other scientists of that time and earlier, had prosecuted researches in behalf of agriculture, but this enterprise in Moeckern marks the beginning of the agricultural experiment station proper. So useful was its work that others soon followed. At the end of five years there were five; in ten years, fifteen; in fifteen years, thirty; in twenty years, fifty-six experiment stations in the different countries of continental Europe. And to-day, after a lapse of thirty-six years, there are in Prussia, thirty-four; in Germany, sixty-one; and in the other European countries, enough more to make the whole number, including the institutions which, variously organized, are all working for the same purpose, not much less than one hundred.

In these stations several hundred chemists, physiologists, botanists, and other men, from two or three to as many as fourteen in each, are constantly at work searching after the precious truths which help farmers in their calling. Studies of the atmosphere and

the soil; of the nutrition, growth, and culture of plants; of the feeding and breeding of animals; of milk and butter production, and other matters pertaining to dairying; of the diseases of plants; inspection of fertilizers and seeds; in short, whatever may be done by experimental science to further the great interest they represent, makes up the labor of the stations.

In 1876, the twenty-fifth anniversary of the establishment of the first station was celebrated by a meeting of representatives of all the stations at Moeckern. A special volume of the organ of the German stations (*Die Landwirthschaftlichen Versuchs-Stationen*, The Agricultural Experiment Stations) was published in honor of the event. In this a list of the titles of the published memoirs and other accounts of the scientific labors of the stations with references to the publications in which they appeared, occupies 141 pages, and other matter relating to the history and statistics of the stations enough to make 449 pages all told. And the ten years since then, have with the increase of the number and facilities, been years of constant productivity.

A small part of the resources of the European stations is derived from private gift or from fees for work done; considerable comes from agricultural societies, still more is supplied by the government.

To-day the agricultural experiment stations are an integral part of the internal economy of Germany and other European nations. To talk of giving them up would be like proposing to abolish coast surveys or schools. Such has been the progress of the experiment stations in Europe.

THE ENTERPRISE IN THE UNITED STATES. THE CONNECTICUT STATION.

The veterans who write the war articles in the *Century Magazine* recount their campaigns of the four years of the war in a way that helps us realize what trying but yet inspiring times they were. I feel a little like an old soldier when I think of the two seasons' campaign we went through to get the Connecticut station started, and of the other two years' struggle which it took to get it firmly and permanently established. I suppose most any one of us would, if put back fourteen years, enlist again, but I know one who would not seek the position of recruiting officer.

For years before the Meriden meeting, the Connecticut Agricultural Society, and the State Board of Agriculture, with its long

time Secretary, Mr. Gold, and especially Professors Norton, Johnson and Brewer, had been preparing the way. The European stations had been discussed to some extent in the papers and at conventions. The land-grant colleges had made some beginnings in this direction. The Bussey institution had been organized at Harvard University, and Professor Storer's excellent work was appearing. Connecticut farmers were already worked up on the matter of testing fertilizers; in short, the time was ripe for the movement.

Mr. Gold had invited Professor Johnson and myself to lecture at the meeting, and to my inquiry of the latter, my former teacher, what he thought of the advisability of saying something about experiment stations — I was fresh from student life in Germany where I had seen somewhat of their workings—he said, "Yes, by all means, go ahead." The ostensible theme was fertilizers, and the address attempted to tell something about the way in which the German stations helped the farmers in their purchase and use. Professor Johnson followed with a talk about the stations that increased the interest greatly. There was lively discussion and the convention decided that an attempt must be made to have a station in Connecticut. A committee of one from each county in the State was appointed to push the matter. But public opinion must first be worked up. Secretary Gold had a large edition, I believe ten thousand, of extra copies of the lectures and discussion printed, and sent them broadcast through the State. A number of farmers' meetings were planned in different parts of the State at which Professor Johnson, Secretary Gold, and others, including myself, talked experiment stations, and thus the winter's campaign opened.

The result you will find in the report of the next annual meeting of the board, which was held at Woodstock. The committee, as its Chairman, Mr. Webb, stated at that meeting, had concluded from Professor Johnson's estimates that, "to establish it (the station), to get apparatus and chemicals that would be necessary, and to carry it on in such manner that it would be a credit to the State would require about $5.000 (per year); and then it would have to be managed with the closest economy, and the investigations confined to a comparatively limited number of questions." To raise this amount of money by subscription through the State they thought impracticable, and concluded that the legislature must be applied to. As Mr. Webb reported, "in talking with the members of the legislature not a single objection was made on the part of

any lawyer, merchant, minister, or any man from any other occupation than agriculture."

The farmers were the men who threw the obstacles in the way. Some of the agricultural committee favored the scheme, others opposed it, and not a few of the farmer legislators smiled knowingly at the notion of asking them to vote money for scientific experiments to help their farming. But strong petitions had been sent in and strong men urged the measure, and "the bill which provided for an appropriation of $8,000 a year [the sum the committee had concluded to ask for], was retained in the committee of agriculture until near the close of the session, and then reported with the recommendation that it be laid over to the next session of the General Assembly." There was a strong feeling at the Woodstock meeting that the enterprise must be pushed again, and so another series of meetings was held during the winter, and when the legislature convened it came up again. Senator Larrabee, Chairman of the Agricultural Committee, favored it, as did many other men who had been waked up to its importance and usefulness. But it was the men in the back towns who did the most of the voting. They had not attended the meetings of the board, and were not in sympathy with the idea. They understood the value of money, but not of science. I am not here to find fault with them. I came from just that stock myself, way up among the Green Mountains, where the experiment station idea did not sprout until years after it had ripened in Connecticut and I know that in a good many things they are wiser and better than some of us folks down here. As the session of the legislature advanced it became evident that the bill could not get through the committee, much less through the two houses.

Then, and not till then, Mr. Orange Judd of the "American Agriculturist," who was at that time a citizen of Connecticut, and by his warm advocacy of the measure in that paper, which had a very considerable circulation and influence in the State, had done much to work up the favorable sentiment that did exist, came forward and made to the legislature an offer on his own part of one thousand dollars, and on the part of the Trustees of Wesleyan University of free use of rooms in the Chemical Laboratory in the Judd Hall of Natural Science, donated by himself to that institution, on condition that the legislature would give $2,800 per year for two

years to be used with the amount offered by himself in defraying the expenses for assistants, apparatus, and incidentals, to make a beginning. He argued that two years of the actual working of a station would demonstrate its importance so clearly that the legislature would then take the enterprise and support it well. The men whom the effort had not reached, who were not educated up to the idea of the station, and had little faith in it, knew that the "Agriculturist" was in the way of showing up humbugs and not of supporting them, and when so well known a citizen was willing not only to assure them that a place for the station would be provided, but to pay part of the expense of carrying it on, they were ready to favor the proposal, and it passed.

Pardon an egotistic indulgence in speaking of personal experience if I say that, when at the close of the summer vacation during which this had been done, I returned to the college where I was charged with the care of a department as my regular duty, and found myself young and inexperienced, with the responsibility of directing this new enterprise imposed upon me, not only without my seeking, but without my previous consent, I was a bit dismayed at the task. But the men who had been most prominent in promoting the enterprise came forward and helped constantly and efficiently, an advisory committee of their number was organized, with Mr. S. M. Wells as chairman, and several of your State board, including Messrs. Gold and Hubbard as members, and so the Connecticut station was an accomplished fact.

Of the history of the station during the two years of its infancy it is meet that I should say but little. A baby with young parents ordinarily gets along very well, especially if there are some grandmothers or experienced aunts and good nurses around to help and advise in the trying times of colic, but although there were plenty of older and interested friends about at this time, this was not only the first baby in the family, but the first one that any of them had had any responsibility for. If there was not wise nursing there was enthusiasm; and, to go further into domestic details, there was occasionally something to be done o' nights.

The work of the laboratory was to be organized and carried on, its scientific phases of course required a deal of time and study, and the practical matters of daily detail were more or less laborious and perplexing. Besides these things, there were the especial wants of the farmers to be met outside; sympathy was to be ob-

tained, and public sentiment in favor of the institution cultivated. The interest which was excited in Connecticut was extending to other States. All this was encouraging, but meant hard work. With the rest, there was an extensive correspondence to be attended to. I remember leaving the laboratory after six o'clock one night with about eighty letters, which were carried home, and answered or otherwise disposed of before the sun rose the next morning.

The reports of the Middletown station, the most of which were included in the reports of the State Board of Agriculture for 1876, 1877 and 1878, contain the story of what was done. Whatever else they may tell of good or bad they have the names of a number of most worthy workers, who have remained faithful to the cause of agricultural science. Such are, Dr. Neale, who has since become widely known as the unusually able chemist of the New Jersey station; Dr. Jenkins, who still continues to serve Connecticut as the efficient vice-director of our own station; Professors Balentine and Jordan, who, the one as professor of agriculture in the Maine State College and the other as director of the Maine Experiment Station, are most creditably serving the interests of scientific agriculture in that State, nor must I fail to mention our lamented Herr Warnecke, who came to us from Germany full of the knowledge and the enthusiasm of a German agricultural chemist, and who afterwards joined the force of the station in North Carolina, but has since died—these have shown by their labors for experiment station science, elsewhere as well as in Middletown, by what sort of men our work was done.

But the Legislature had provided only for two years' support. When the time came around for the test of that part of our success which was to be measured by what the State should provide for the future, I must confess that some of us were pretty anxious. The times were bad. It was in the dark days of 1876 and 1877, not the darkness of winter, but of financial crisis. The Legislators felt that whatever else was done the burden of taxation must as far as possible be relieved. Anyone who spoke of appropriations not absolutely necessary was met with a smile too significant to be misunderstood. The following from the final report of the work of the Middletown station, of which the major part was published in the report of the Secretary of Connecticut Board of Agriculture for 1878, tells what was done: "In due time a bill was presented to the Legislature of 1877, providing for the permanent establishment

of the station. The fact that, notwithstanding the loud call for economy, the cutting down of old appropriations, and the utter refusal of new ones, a bill appropriating $5,000 per annum, permanently and unconditionally 'to promote agriculture by scientific investigation and experiment,' passed both branches of the Legislature unanimously, and with no essential alteration from the original draft proposed by the director and approved by the advisory committee, save such as was needed to give it legal form, was to all concerned a source of great satisfaction."

Thus Connecticut, which, through a bill passed unanimously in the Legislature of 1875, had achieved the honor of establishing the first Agricultural Experiment Station in America, two years later did itself the further honor of placing its station upon a permanent financial basis.

Laboratory accommodations were thereupon offered by the Sheffield Scientific School and the burden of directorship was laid upon Prof. Johnson. The Legislature of 1881 increased the annual appropriation to $8,000 and as the Scientific School was no longer able to give it a home, a further appropriaton of $25,000 was made for the acquisition of some five acres of land in the suburbs of New Haven, and appropriate buildings. Thus a permanent place and generous support are provided for an institution whose usefulness is too well known to need telling here.

The example of Connecticut was infectious. Soon after the start at Middletown, North Carolina established a station in connection with the university at Chapel Hill. Later it was removed to Raleigh, the capital of the State, where, as from its beginning, able and enthusiastic workers have verified the wisdom of the southern State, which first established an institution of this kind within its borders. In 1880 the New Jersey Agricultural Experiment Station was established by act of the Legislature with an appropriation of $5,000. It was located at New Brunswick, in connection with the Rutgers Scientific School, which is the agricultural college of the State, and has furnished it with laboratory and farm. The Legislative appropriation has been increased, and, if I can rightly judge, no experiment station, even in Germany, has done better or more useful work in proportion to its means and the demands laid upon it, than has the New Jersey station under the direction of Prof. Cook and Dr. Neale and their assistants.

In speaking of the individual stations in the several States in this country and their work, I shall not know where to stop unless it be right here. But I should not fail to at least mention some of the institutions which have since been established and carried on independently of legislative appropriation. The work done at the Bussey Institution, the Cornell University Station, at Houghton Farm, and other places is worthy of more than a passing remark. At the beginning of the present year some nineteen experiment stations and kindred institutions had been organized in seventeen different States. The scientific work which they have already done has assumed such proportions that the mere cataloguing of publication with reference of resources, is in itself a serious task, as Professors Alvord and Frear, of the Massachusetts and Pennsylvania agricultural colleges, who have this particular matter under their care, will, I think, be ready to assure us. The last Congress, by an act approved near its close, and familiar to all of you as the Hatch Bill, has arranged for the establishment of an agricultural experiment station in each State and Territory of the Union, with $15,000 a year to be supplied from the national treasury for its current expenses.

Such, in brief, is the history of twelve years of experiment stations in the United States.

WHAT THE AMERICAN STATIONS HAVE DONE.

Our stations, then, have passed their apprenticeship and are turning off work with reasonable rapidity and have done so for some time. What is the outcome? Their reports tell part of it but not the whole. If you read them you will see accounts of analyses of fertilizers that have not merely protected farmers from fraud and raised the general qualities of the wares, but have done far more, have helped to educate users as to their proper use. This, by the way, means most efficient scientific propagandism. What is better, researches are accumulating; there has been a great deal of experimenting of many different kinds. Our own station has made studies on the properties of soils which have an important bearing upon tillage, on the effects of different chemicals upon the growth of plants, on forage plants, on the composition of feeding stuffs, and, what is one of the most necessary and useful kinds of work, studies of the methods of investigation. In New Jersey a great deal of research has been devoted to experiments on feeding for

milk production, on the culture of sorghum and the manufacture of sorghum sugar, on soils and fertilizers, and the effects of different fertilizers on plant growth. And so as you go through the list of the stations and examine their published reports you find them full of results of experimental inquiry which it would be impossible to enumerate, much less describe in an hour's talk.

The different localities where stations are situated, offer special problems for their study, in addition to those of interest everywhere. Compared with what needs to be found out their work thus far amounts to extremely little; compared with its cost it is beyond valuation. For it must be remembered not all the good which a station does is what appears in its printed reports and what is talked about in agricultural papers and farmers' meetings. A large part of what they do is like the action of a hidden fountain, nothing appears upon the surface save the greener herbage, and the larger growth.

Instead of trying to detail what our stations have done, let me call your attention to some things which will serve as landmarks of the late progress of agricultural science, in its application to practice and see if they do not mean a great deal and if a large part of the progress is not due to the experiment stations and the movement which they represent.

Ask yourselves this question. In the year 1875, when the experiment station work began in Connecticut, how many farmers of the country, how many right here in our own State, were familiar with the terms nitrogen, phosphoric acid and potash; could tell what per cent of each there ought to be in this, or that, or the other fertilizer; and were in the way of judging of the value of a phosphate or a guano or a potash salt by its chemical composition, and of using it as experience or experiment had taught that it was in place? How many understood that the chief office of these materials is to supply the plant-food that their crops need, and the soil fails to furnish? With all the intelligence, with all the ability, with all the thinking, and all the reading of even the most progressive farmers, the man who knew these things well was a rare specialist. Two or three years ago I noticed an advertisement of a firm of fertilizer manufacturers, prepared for circulation in Connecticut and in the other States thereabouts. It recommended the fertilizers of that firm. There was not a word in it about what remarkable increase of crops they would bring; there was not a

single recommendation from a farmer who had put them to practical test and learned their wonderful value from the increase they had brought; but there were statements of percentages of nitrogen, of phosphoric acid, soluble, reverted, insoluble, and of potash, which the fertilizers had been guarranteed by the manufacturers to contain, and alongside these were given the percentages which had been found in the articles as the farmers had bought them, and the stations in their behalf had analyzed them. Now this is a firm of shrewd business men; they manufacture and sell fertilizers to make money. The head of the establishment happens to be interested in agricultural science, and I am very sure would be very glad to do anything he could to help the teaching of agricultural chemistry. But it was not for that purpose that these advertisements were printed and circulated, it was because the dealers had found out that the farmers to whom they wanted to sell their goods looked at just these percentages of fertilizing ingredients and compared them with the guarantees and the prices, in deciding what ones they should buy. The had found that the farmers had learned something of chemistry and were buying their fertilizers on a scientific basis, and that it would pay them to advertise and to sell on that basis. What would any of you have said at that Meriden meeting fourteen years ago, if Prof. Johnson or I had prophesied that within ten years that would be done in this State of Connecticut?

I remember one thing that Prof. Johnson did say. It was that farmers in Germany who had the help of experiment stations to analyze their fertilizers, bought them with the same confidence that they did sugar and nails and cloth. The inference was that Connecticut farmers might do the same if they had an experiment station, and Connecticut farmers are doing it now.

Why, think of it! One of the lively discussions in the *Connecticut Farmer* here two or three years ago was about the question whether it was more profitable to buy commercial fertilizers ready mixed or to buy the raw materials and mix them, and the whole question hinged on the cost per pound of nitrogen and soluble phosphoric acid and potash, as sulphate or muriate, and the like. And the average composition of the materials was discussed with a use of technical terms that a few years ago were scarcely heard of outside chemical laboratories and the fertilizer trade.

Let me cite one more illustration of the late progress of agricultural knowledge. Nineteen or twenty years ago, in your Bridge-

port meeting, Prof. Johnson gave some accounts of European experiments on the feeding of cattle, and told about the nutritive ingredients of fodder and the ways in which they acted as nourishment. That was the earliest exposition of the subject, on this side of the Atlantic, of which I am aware. Five years later through the Secretary of the Maine State Board I was invited to say something on the subject at a meeting in that State, and attempted to explain some of the experiments in the German stations and their results. Harris Lewis, the President of the New York State Agricultural Society, was present and was inclined to make light of the talk of protein and carbohydrates, remarking that as "American farmers could not have a chemist at every barn door," that sort of a theory would not do them much good. The next winter at the Woodstock meeting of the Connecticut Board, by invitation of its secretary, I discussed the same topic, and to my great satisfaction the physiological chemistry was received with apparent favor. "Protein" and "crude fiber" and "maintenance rations" were new terms, but the gentlemen saw that back of them was something worth knowing. Well, since that time the matter has been set forth in books and papers. The results of foreign experiments have been, in a measure, made accessible to American readers. Our experiment stations have tested them by experiments of their own and with most interesting results. And if you will take the pains to look through the columns of the agricultural papers that have the largest circulation among intelligent farmers, you will notice that they discuss the chemical composition of fodder-materials, the percentage of protein and fats in hay and straw and bran and meal, the proportions of these appropriate to maintenance rations and rations for milk or for fattening, and all that sort of thing; using the chemical terms for the nutritive ingredients as they do bushels and pounds for fodder-materials, and discussing the principles of nutrition as they do the course of the market.

Now when we pause and reflect on these things,—and other illustrations of the same progress will occur to every one of you—are they not remarkable, almost wonderful? We are in the midst of a revolution in this respect. Happily for us it is going on quietly, but it is going on none the less surely.

An illustration of the same general fact of progress in the right direction, because in the direction of the highest application of real science, the most earnest desire for the truth, occurred in the late

convention of representatives of agricultural colleges and experiment stations in Washington, who were considering plans for the stations to be organized under the Hatch bill. In all the discussions, whenever reference was made to the manner of disposal of the expected funds and the character of the work to be done, there was the strongest expression of the sentiment that every dollar must be honestly and faithfully applied to the actual purpose, namely, experimenting in behalf of agriculture, and that the best science must be cultivated in the work. And nothing elicited more sympathetic response or more earnest approval than the statement, in an address upon the management of experiment stations, by the Nestor of American agricultural chemists, Professor Johnson, that the fundamental condition of success is the most faithful adherence to the truth.

Who would have thought that at the Meriden meeting there would be such things as these to report at a meeting only fourteen short years later?

Of course this progress of the past few years is not all due to the experiment stations. The schools, the press, the progressive men, the spirit of the time have all contributed to it. But in the existing condition of things in this country the experiment station is and must remain an essential and most important factor.

But I must cite one direct outgrowth of the work of the stations. I use the word outgrowth because it commenced with the station, although it had a force of its own which developed it and has illustrated in its growth and fruit the truth that the influence of the station extends far outside its immediate limits.

The reports of the Middletown station give accounts of field experiments with fertilizers conducted by farmers. The following from the First Annual Report will explain:

"We are continually receiving such inquiries as the following:—'I have a piece of old land that has been somewhat worn down by a number of years' cropping. Will it pay for me to try guano, or superphosphate, or potash salts?'

"'Are the———or———fertilizers of enough value to farmers in———county, to warrant their purchase these hard times?'"

"'Will you be kind enough to give me a proper formula for a fertilizer for a corn crop?'"

"No chemist or any other man can prescribe fertilizers for different soils or crops. The differences in different soils or other conditions are too great. For farmers who have not their own experi-

ence, or that of others in like circumstances, to guide them, the most sensible method for determining what are the deficiencies of their soils, and how they will be most economically supplied to given crops, is to try experiments on a small scale; to put the question to the soil with different fertilizing materials and obtain its reply in the crops produced.

"In order to facilitate the introduction of experiments of this sort among the farmers of Connecticut, the station has made arrangements to procure materials for the purpose for a limited number of persons willing to undertake the trials."

As the result of one season's experience the plans were slightly modified and a larger number of experiments were made. The *American Agriculturist*, recognizing their usefulness, recommended the experiments to its readers and assisted them in procuring the fertilizers. The results have been given from time to time in the reports of the Connecticut Board of Agriculture, and those obtained up to 1882 were summarized in a somewhat detailed account published by the Department of Agriculture in Washington. The ostensible object of the larger number of the experiments was to work upon farmers' soils; underneath this lay in my own mind a deeper purpose, to work upon their owners' minds. In this respect, as in others, the outcome was most gratifying. I can here only refer to a few points.

With the sets of experimental fertilizers blanks were furnished on which any who should choose were invited to send reports of their experiments. Nearly three hundred experiments were reported to me. They came from colleges, experiment stations, and individual farmers in all the States east, and from some west of the Mississippi, and from several of the British provinces. The quality of the work as indicated by the reports is most gratifying.

The experiments were of two classes. The first, which may be called general experiments, are of a simpler sort, and intended primarily for soil tests, involve the use of eight or more different kinds and mixtures of fertilizing materials containing nitrogen, phosphoric acid and potash. The second class, the "special nitrogen experiments," were of more complicated character, and have had for their object the study of the feeding capacities of some of our more common cultivated plants, with special reference to the nitrogen supply.

THE FEEDING CAPACITIES OF PLANTS.

The experiments bring us face to face with one of the most important problems with which agricultural chemistry has to deal, and at the same time throw some new light upon it. I refer to what may, perhaps, be most properly called the feeding capacities of plants, their power of gathering their supplies of food from soil and air, and the effects of the artificial supply of different ingredients of plant-food upon their growth.

A vast deal of experience upon the laboratory and in the field bears concurrent testimony to the fact, though we are still deplorably in the dark as to how or why it is so, that different kinds of plants have different capacities for making use of the stores of food that soil and air contain. Of the ingredients of plant-food in our soils, the most important, because the most costly, is nitrogen. Leguminous crops, like clover, do somehow or other gather a good supply of nitrogen where cereals, such as wheat, barley, rye and oats would half starve for lack of it, and this in the face of the fact that leguminous plants contain a great deal of nitrogen, and cereals relatively little. Hence a heavy nitrogenous manuring may pay well for wheat and be in large part lost on clover.

I cannot go into details of the experiments. Suffice it to say that the plan consisted in applying different fertilizing materials, nitrate of soda, superphosphate, potash salts, and the like, singly and in different combinations to parallel strips of land and noting the effect on the crop produced.

Let me read to you some of the practical conclusions from this accumulated mass of observations by farmers who applied the teachings of the most advanced science to the study of the needs of their soils and crops and the best ways of supplying them. I select one topic, the nitrogen supply, for corn, potatoes, and other crops. Farmers in Connecticut, Massachusetts, and other States have been in the way of expending millions of dollars every year for nitrogen in fertilizers. Corn contains a good deal of nitrogen, and a great deal has often been put into fertilizers for it.

The question whether corn can gather its own nitrogen, like clover, or demands an artificial supply, like wheat, whether it is an "exhausting" or a "renovating" crop, has been much discussed. Upon its answer depends in large degree the success of corn-growing in our older States. The experiments referred to bear emphatic testi-

mony upon this point. The corn has almost uniformly refused to respond to nitrogen in fertilizers, and persists in getting on well without any artificial supply.

The experiments I have referred to throw some light upon this question. Among them were a considerable number of the "special nitrogen experiments," referred to, in which the effects of nitrogen in different forms of combination and different quantities were tested. The nitrogen was supplied in the form of nitric acid, in nitrate of soda, in the form of ammonia, in sulphate of ammonia, and in the form which chemists call organic nitrogen, in dried blood. With these, superphosphate and muriate of potash were employed. Omitting the results where the ingredients were used singly, let me give you a brief outline thus obtained with the complete fertilizers containing the nitrogen in different forms and amounts. These included in each case a mixture designated as "mixed minerals," which supplied 300 pounds of superphosphate and 150 pounds of muriate of potash per acre To this mixture the nitrogenous materials were added in quantities sufficient to furnish on the different plots twenty-four, forty-eight, or seventy-two pounds of nitrogen per acre. The effects of nitrogen in the different forms of combination were on the average about the same.

Taking these "special nitrogen experiments" and the "general experiments" in which the mixtures with forty-eight and seventy-two pounds of nitrogen were not used, the results with corn may be stated thus. The figures are for bushels of shelled corn:

In number of trials.	With nitrogen.		The average increase of corn was—	The increase of nitrogen in the crop was—
	Amount per acre.	Contained in crop of—		
	Pounds.	*Bushels.*	*Bushels.*	*Pounds.*
95	24	18	4.6	6.2
76	48	36	5.3	7.1
42	72	54	6.6	8.8

Or, estimating the results in dollars and cents:

In trials, total number.	With nitrogen, amounts.	Costing.	The nitrogen paid for itself in trials.	The nitrogen failed to pay for itself in trials.	The average loss in the several trials was—
95	24 lbs	$5 50	21	74	$2 62
76	48 "	11 00	13	63	6 76
42	72 "	16 50	4	38	11 22

The effects of the nitrogen upon corn, potatoes, and oats may be expressed in another way. Taking the averages of all the experiments (of which I should add that the number with potatoes was much smaller than with corn, and those with oats smaller still), and calling the yield with "mixed minerals" (superphosphate and potash salt) alone, that is to say, with all the materials which are ordinarily contained in commercial fertilizers, except nitrogen, at one hundred, the amounts of produce with the different quantities of nitrogen will be as in the table herewith.

Results of Experiments on the Effects of Nitrogenous Fertilizers upon Corn, Potatoes and Oats.

In experiments with—	Corn.	Potatoes.	Oats.
Estimating the yield with "mixed minerals" at.....	100	100	100
The yield with mixed minerals and nitrogen, 24 lbs., was	111	127	154
The yield with mixed minerals and nitrogen, 24 lbs., was	112	138	166
The yield with mixed minerals and nitrogen, 72 lbs, was	115	127	171

In brief, the use of large quantities of nitrogen, such as have been often recommended for corn is rarely profitable.

FEEDING CAPACITIES OF OTHER CROPS.

The results of the experiments with other crops were briefly summarized in an account given in one of the reports of the Connecticut Board of Agriculture, as follows:

"Taking all in all, the potatoes responded well to the superphosphate, the potash salt, and the nitrogenous fertilizers, and the "complete fertilizers," have been most profitable in almost every case where the weather permitted fair growth. None of the other crops, except, perhaps, turnips, have shown such uniformly beneficial results from all the materials.

"The experiments indicate very decidedly that the potato plant differs from many others in respect to the effect of these fertilizing materials upon its growth, and imply that it has less capacity than corn for gathering an adequate supply of food from natural sources. It seems to demand a full and immediately available supply of nourishment for its successful growth.

"Concerning the other crops, the data at hand are too meager to warrant any general conclusions. * * * In general, however, the experiments accord with the common notion that makes superphosphate almost a specific for turnips. But they imply that even when the superphosphate is supplied in abundance, the turnip is not usually able to gather enough of the other materials for a full yield unless they are close at hand in readily available forms."

THE VALUE OF SCIENTIFIC EXPERIMENTING BY PRACTICAL FARMERS.

But perhaps you think that, after all, though this work may have been a pleasant pastime and possibly instructive to the doers, it was only farmers' science after all, and of no especial consequence either as a contribution to knowledge or for its influence on other farmers. Let us see

First as to scientific value Here only a few words will suffice. We Americans respect foreign science as foreigners respect our practical skill. But we think the Frenchmen and the Germans are loth to acknowledge the merits of our achievements in science or in literature. You all know of the French Academy of Sciences. That august body publishes reports of contributions to knowledge by the celebrated men who are its members and by other "savants" whose researches commend themselves sufficiently to its notice and approval. The last figures I read you are taken from an account of these same experiments by American farmers which the Academy published in its *Compets Rendus* (*Transactions*).

I have here an article from a German journal of agricultural science, published in Munich, where Justus Liebig, the father of

agricultural chemistry, so long lived and labored. It is by Liebig's son. It is written for students of agricultural science and scientific farmers in Germany. It gives accounts of farm experiments and their methods and results. It is entitled "What we can learn from America?" The experiments are the very ones I have been telling you about.

I have said that these experiments were made by farmers, experiment stations, and agricultural colleges. Some of them, which have been continued and amplified, especially during the past few years, by institutions which have had means, have now got beyond the range of any individual farmer unless he be a man of wealth. But if a committee of three as good men as you could select were to take the hundreds of reports of those of which I have spoken, study them carefully and select the best experiments, those which gave evidence of the best combination of accuracy, thoroughness, and perseverance year after year, I feel very confident that the list would not be confined to those of colleges or experiment stations, but would include, as among the very best, those of two men, who have reported some but not enough of their work at the meetings of this Board, two of your brother farmers in Connecticut, Charles Fairchild of Middletown, and W. I. Bartholomew of Pomfret.

Of the scientific value of their work no words of mine are needed after the other testimony I have brought you. But what of the practical value? The testimony of such practical farmers as Mr. Bartholomew and Fairchild, men who have had their living to make from their farming while they have done their experimenting—and what has been said of them is not laudation, high praise as it is, but cold, hard fact—will surely be more acceptable to you than anything I could say. I quoted the following statements of theirs once before [in a report on Field Experiments in the report of the Connecticut Board of Agriculture for 1881], but they will bear repeating.

After the clear practical paper on the results of his experiments which Mr. Bartholomew has read before you this evening, I need not enlarge upon them, but will only cite some statements he made to me some time since in answer to the request that he would tell me in what ways and to what extent the large amount of experimental work he has done has been of actual benefit to him as a farmer. He answered as follows:

"In reply to your question I will say that I have learned to place great confidence in commercial fertilizers when properly used, as furnishing the most reliable and economical materials for increasing my crops."

"I have learned that the effects of the different substances used, although varying much from each other, are nearly identical in different fields and in different years on my farm, always showing a tendency to the same characteristics."

"I have learned that these fertilizers are much superior in quality to those we obtained before the establishment of the Experiment Station."

"I have learned that this farm, which my father, after fifty years of acquaintance and cultivation, pronounced ill-adapted to the raising of corn, gives me, under similar treatment, with the use of phosphate of lime in addition, in corn one of my most profitable crops."

"I think I have learned that by the proper use of commercial fertilizers as indicated in the different trials, I can obtain, at fair profit, finer potatoes, free from disease and blemish, than by any other means known to me."

"I have learned that by the use of one or more of these substances as adjuncts to farm manures, I have been enabled to obtain at small expense, superior crops of corn, oats and potatoes with less manure, while the remainder of the manure applied as top-dressing to grass lands, has materially increased my crops of hay."

"And finally, to include the whole matter, I find that I am keeping much more stock, getting better crops, and better satisfaction from my farm than before."

In the course of a long talk with Mr. Fairchild, in which he detailed a number of results of his experiments, I made a similar inquiry of him.

One of the questions to which I solicited a brief answer was this, Can you state some of the ways in which your experiments have been of direct practical utility to you?

The answer was this, "I think they have helped me, and will help me in many ways:

1. They show what fertilizing materials my crops must have.

2. They show me in what quantities, in what forms, and in what ways I should apply different fertilizers.

3. They save me money by enabling me to buy what I want without using a large quantity of materials I do not want.

4. I think I shall thus be enabled to raise all kinds of crops on very poor land with profit.

One of Mr. Fairchild's remarks impressed me greatly. It was this:

"Under the old system of farming, it is no wonder the boys leave their farms. You can't blame them. I did so myself, came back, tried again, and should have given up once more if it had not been for these experiments, and what I have learned in connection with them. As it is, I find myself giving up outside work, devoting myself more and more exclusively to my farm, supplementing the labor of my hands with the labor of my brain, and I feel the benefit in my purse, in my home and in my mind."

These details of Mr. Fairchild's experiments, and these words as he spoke and wrote them, I have given for a purpose.

Like thousands of boys brought up on an eastern farm, Mr. Fairchild took Horace Greeley's advice, and went West. But circumstances called him home again, and he concluded to try to bring up the old farm. It was up-hill work, and he eked out his income by teaming and other outside labor. Some years ago I became acquainted with him as one of the attentive and intelligent participators in farmers' meetings. One day he took me out to his farm and showed me what he was trying to do. I very well remember a meadow on which he told me he had applied, a year or two before, nearly a ton of fish-scrap per acre, which he had to buy with the proceeds of his outside labor, and haul several miles. So far as appearance showed, it had done no good at all. I naturally inquired if he had tried potash salts. This suggested the experimenting which he began at once.

After one or two seasons' experience, in response to an inquiry as to how he was getting on, he told me he thought he was learning something that would be of great use to him, and added that he found himself devoting more attention to his farm. The next season he told me that he was having better success with his farming, and was giving less time to other enterprises. A year later, calling at our laboratory to make some inquiries, he remarked that he was taking scarcely any contracts for teaming, but was devoting himself almost exclusively to his farm. Last spring he called again and remarked, "My wife tells me I must set up a prescription-shop, so many of my neighbors are coming to find what fertilizers I use for my corn." A

few weeks ago he was in again to bring reports of his experiments, and at that time occurred the conversation reported above.

These things I have said with a purpose. There are other Charles Fairchilds and W. I. Bartholomews in Connecticut. I do not believe their neighbors have counted them more wonderfully gifted than any other men, and yet their memory will be green long after they depart from among the farmers of their State, because of the good work they have done. That of Charles Fairchild, whom death removed from us not a year ago, is with us and will remain. But what I wish to urge is that what they have done is but a type of what sorely needs to be done in many places in the State, and by many men, and that Connecticut has the men to do it.

And here I wish to make a suggestion to the Board of Trustees and to Instructors of the Storrs School. That institution has already won a place in the respect and regard of the farmers and the other citizens of the State. But it needs to win more. It can do so, and, at the same time render service to the agriculture of the State in other ways than by teaching boys the science and art of farming. One of those ways is by allying itself with such men as Mr Fairchild and Mr. Bartholomew ; and, with some of the fund it is to have for its new station, securing their co-operation in experimental work.

Farming is in some respects like sailing on a trackless sea with here and there a headland to guide or a rock to wreck. Such men are lighthouses. The more of their light we have, the more safely and surely we shall sail.

IN CONCLUSION.

In thus recounting to you a few of the many things of interest in connection with the history of the experiment station in the United States, I have dwelt especially upon the one in our own State, and in speaking of what has come of its work, I have enlarged upon what farmers have learned and done through its influence, because this is a meeting of Connecticut farmers. Among chemists, other lines of thought would have been of greater interest. But to every one the theme suggests, as the conclusion of the whole matter, the great advance as well in the science as in the practice of agriculture.

"Science moves but slowly, slowly, creeping from point to point;
* * * * * * * * *
But I doubt not through the ages one increasing purpose runs,
And the thoughts of men are widened with the progress of the suns."

It is much that science does advance, though it be but slowly; it is more that it helps us to easier, more productive, and more profitable labor, but most of all should we rejoice for the intellectual and moral elevation it brings.

And so I close as I begun, insisting that, great as has been the practical value of the experiment station in the United States, great as it has been in Connecticut, its highest usefulness is in the intellectual elevation it causes, in that indirect influence which is unmeasured and measureless.

CORN ENSILAGE.

From New Jersey State Experiment Station Report, 1884.

GEO. H. COOK, L. L. D., Director.

Since the growing of corn for the express purpose of preservation in the silo for use as stock food is engaging the attention of farmers, the kind or variety to grow as giving the most food material to the acre and of a composition best suited to the wants of the animals to be fed, becomes an important matter. The following report of experiments conducted at the New Jersey State Experiment Station will give information in this direction not elsewhere available.—SECRETARY.

Results from previous experiments carried out upon the College Farm have shown:

1. That the food in corn ensilage produced no more milk than an equivalent amount of food in dried fodder corn.

2. That the losses of food, due to fermentation, are no greater when fodder corn is dried in shocks, than when fodder corn is placed in silos.

These conclusions indicate that the silo is simply a place in which green food may be preserved; not a place in which fodder may be stored with reasonable expectation of improving its quality.

COMPARISON BETWEEN FIELD CORN AND ENSILAGED FODDER CORN.

The interest awakened by the discussion of ensilage, has created a demand for a comparison between field corn and fodder corn.

This comparison involves the following questions:

I. How much digestible food can be secured from one acre planted in field corn, and how much from a corresponding acre planted in fodder corn?

II. What is the cost per acre of gathering a crop of field corn, and preparing it for dairy food; and what is the cost per acre of ensilaging a crop of fodder corn?

III. What is the relative feeding value of the digestible food in corn meal, in dried stalks, and in corn ensilage?

IV. How much potash, phosphoric acid and nitrogen, is removed from an acre by a crop of field corn; and how much by a crop of fodder corn?

In 1883 a uniform field, upon the College Farm, was heavily manured, and prepared for corn in the usual manner.

Five and three-tenths acres were planted, for fodder only, in rows three feet apart. The yield from this area was 149,445 pounds; an average of fourteen and one-tenth tons per acre.

Ten and one-quarter acres were furrowed for field corn and planted in hills 3 ft. 6 in. apart each way.

The crop was cut up and shocked in the usual manner. After husking the entire product was weighed and found to average 68.3 bushels of *shelled corn*, and 2.2 tons of dried stalks, per acre.

I.

AMOUNT OF DIGESTIBLE FOOD PER ACRE.

1. In a crop of field corn.

2. In a crop of ensilaged fodder corn.

The term food embraces three distinct classes of chemical compounds, known as *Proteine*, *Fat and Carbhydrates.*

1. *Digestible Food from one Acre in Field Corn.*

A very large proportion of the digestible food is to be found, of course, in the shelled corn. Nearly forty per cent, however, of the total amount exists in the dried stalks; the cobs also contain a small but noticeable quantity.

SHELLED CORN.

On the 29th of January, 1884, the farm Superintendent shelled thirteen hundred pounds of ears, taken from the crop grown on the field under experiment.

The grain was thoroughly mixed and carefully sampled for analysis.

On the 14th of March a second sample was obtained in a similar manner, representing in this case sixteen hundred and eighty pounds of ears.

The average results of both analyses have furnished the basis for computing the amount of digestible food contained in the shelled corn from one acre.

DRIED STALKS.

Immediately after husking, two tons of dried stalks were cut and shredded in a Lion cutter and crusher, then packed into a silo and heavily weighted.

On the 29th of January, 1884, the silo was opened and ten bushels or more of the dried stalks taken out, thoroughly mixed, carefully sampled and analyzed.

On the 11th of March a second sample was secured in a similar manner. This represented the stalks in the lower half of the silo.

The average results of the analyses of both samples, furnish the data used in computing the amount of food in the dried stalks from one acre.

COBS.

The cobs from sixteen hundred and eighty pounds of ears, shelled March 14th, weighed three hundred and thirty-four pounds; nearly twenty per cent of the total weight of the ears.

These cobs were also sampled and analyzed.

Of the following tables, the first gives the results of the analysis of the grain, stalks and cobs, together with their coefficients of digestibility; in the second table, these results have been recalculated and are expressed in pounds of digestible food with its value per acre.

CORN MEAL, CORN STALKS AND CORN COBS.

TABLE NO. I.

PERCENTAGE, COMPOSITION AND COEFFICIENTS OF DIGESTIBILITY.

	Corn Meal.		Dried Corn Stalks.		Corn Cobs.	
	Percentage.	Coefficient of Digestion.	Percentage.	Coefficient of Digestion.	Percentage.	Coefficient of Digestion.
Loss at 100°	16.17	.....	10.66	.....	17.20	.....
Crude fat	3.92	85	1.06	75	0.29	32
" fiber	1.91	62	32.50	72	28.35	56
" proteine	8.44	79	4.09	73	1.94	25
" ash	1.55	.....	4.80	.....	1.33	.....
Carbhydrates	67.58	91	46.89	67	50.89	36

TABLE NO. II.

POUNDS AND VALUE OF DIGESTIBLE FOOD PER ACRE.

	Total Weight of Crop per Acre.	Pounds per Acre of Digestible.				Value per Acre of Digestible.				Total Value per Acre.
		Fat.	Fiber.	Proteine.	Carbhydrates.	Fat.	Fiber.	Proteine.	Carbhydrates.	
	Lbs.					at 4½ per lb.	at .9 per lb.	at 4½ per lb.	at .9 per lb	
Corn meal	3824.8	127.0	42.8	259.7	2368.7	$5 50	$0 39	$11 25	$21 32	$38 46
Dried corn stalks	4041.0	32.3	945.6	120.8	1269.7	1 40	8 51	5 24	11 43	26 58
Corn cobs	950.0	0.9	150.9	4.7	174.0	0 40	1 36	0 20	1 57	3 17
Total	.....	160.2	1139.3	385.2	3812.4	6 94	10 26	16 69	34 32	68 21

In this experiment, therefore, the digestible food from an acre in field corn consisted of 160 pounds of fat, 1,139 pounds of fiber, 385 pounds of proteine and 3,812 pounds of carbhydrates, valued at $68.21.

2. Digestible Food in Ensilage, from the Product of One Acre in Fodder Corn.

The green stalks were cut up by hand, drawn to the barn and immediately weighed. They were then at once passed through a Ross cutter, driven by tread power, packed into a silo and heavily weighted.

The silo was opened on the 29th of January. After the decomposed material on the surface had been removed, an opening eighteen inches deep was made, and several bushels of ensilage removed. This was sub-sampled and prepared for analysis.

A duplicate sample was secured from another portion of the silo, on the 13th of February, 1884.

Each sample was analyzed separately and the averaged results used in subsequent computations.

Quantity and Value of the Digestible Food in the Ensilage from Fourteen Tons of Green Fodder Corn.

	Percentage Composition.	Coefficient of Digestibility.	Pounds per acre of digestible	Value per acre of Digestible.
Loss at 100° C.	71.31			
Crude fat	0.31	75	70.5	$3 06
" fiber	7.34	72	1452.3	13.07
" proteine	1.72	73	313.0	13.56
" ash	1.36			
Carbhydrates	17.96	67	3626.5	32.64
Total value per acre				62.33

In this experiment, therefore, the digestible food in the ensilage from 14.1 tons of fodder corn consisted of 71 pounds of digestible fat, 1,452 pounds of fiber, 313 pounds of proteine, 3,626 pounds of carbhydrates, aggregating in value $62.33.

	Yield and value per acre of digestible.				Value per acre.	Total yield of crop per acre.
	Fat.	Fiber.	Proteine.	Carbhydrates		
	lbs	lbs.	lbs.	lbs.		
Field corn....	160.2	1139.3	385.2	3812.4	$68.21	68.3 bu. shelled corn. 2.2 tons dried stalks.
Fodder corn..	70.5	1452.3	313.0	3626.5	62.33	14.1 tons fodder corn.

It is evident that, with the single exception of disgestible fiber, the acre in field corn has surpassed that in fodder corn, both in the quantity and value of the digestible food produced.

II.

WHAT IS THE COST PER ACRE OF GATHERING A CROP OF FIELD CORN AND STALKS, AND PREPARING IT FOR DAIRY FOOD; AND WHAT IS THE COST PER ACRE OF ENSILAGING A CROP OF FODDER CORN?

An exact expense account was kept during the entire experiment. In certain cases, however, it is necessary to state how charges were made; for instance, in cutting up the field corn, the expense amounted to $2.09 per acre. As 56 per cent of the total weight of the crop lay in the ears, and 44 per cent in the stalks, the expense was divided upon this basis.

The expense of husking and binding the stalks amounted to $5.58 per acre. It is claimed, in practice, that binding alone requires about two hours' work out of ten; 80 per cent of the total cost has, therefore, been charged to the ears and 20 per cent to the stalks.

Expenses Incurred in Gathering Crops of Field and Fodder Corn, and Preparing Them for Dairy Food.

CORN MEAL.

COST PER ACRE.

Cutting corn, $2.09; of which 56 per cent. is charged to corn meal....	$1 17
Husking corn, $5.58; of which 80 per cent. is charged to corn meal....	4 46
Teams and men hauling corn.....	2 00
Team and men for shelling corn.....	1 50
Team and man for hauling to and from the mill.....	2 00
Grinding 3,824 pounds at one-tenth cent per pound	3 82
	$14 95

CORN STALKS.

COST PER ACRE.

Cutting corn, $2.09; of which 44 per cent. is charged to corn stalks....	92	
Husking corn, $5.58; of which 20 per cent. is charged to corn stalks...	1 12	
Team and men for hauling stalks.....	77	
Labor of loading and stacking.....	95	
Team and men cutting and shredding stalks.....	4 00	
		7 76
Total cost for corn meal and corn stalks.....		$22 71

FODDER CORN.

COST PER ACRE.

Cutting corn.....	$4 28	
Loading corn.....	3 42	
Teams for hauling to barn.....	8 23	
Horse power	1 98	
Labor at cutter.....	3 96	
Labor for packing in silo.....	3 54	
Labor weighting silo.....	1 00	
Total		$26 41

The comparison of the above accounts shows that the balance is clearly in favor of the field corn by at least FOURTEEN PER CENT.

A summary of the results thus far obtained allows the comparison between the field and fodder corn to be drawn upon a standard of dollars and cents.

	Field corn.		Total from field corn.	Ensilage from fodder corn.
	Corn meal and corn cobs.	Dried field corn stalks.		
Value per acre.....	$41 63	$26 58	$68 21	$62 33
Cost of gathering and preparing product for food.....	14 95	7 76	22 71	26 41
Balance to cover rent of ground, cost of raising crop, and profits per acre.....	26 68	18 82	45 50	35 92

By subtracting from the value of the product the expenses incurred in gathering and preserving it, a balance is obtained out of

which must be paid the expenses of manuring, planting, cultivating, etc., as well as rent and profits.

In case of the field corn this balance is $45.50 *exceeding by* $9.59 *the balance from the ensilaged fodder corn.*

This assumes of course that the stalks are carefully utilized as food; if they are wasted, and corn meal is regarded as the only valuable product from field corn, the balance immediately changes to $9.24 in favor of the ensilaged fodder corn.

III.

WHAT IS THE RELATIVE FEEDING VALUE OF THE DIGESTIBLE FOOD IN CORN MEAL, IN DRIED FIELD CORN STALKS, AND IN CORN ENSILAGE?

It has been claimed that in this experiment, the total value of the product from an acre in field corn was $68.21, while that from an acre in fodder corn was $62.33.

These figures were obtained by assuming that *digestible* proteine and fat were worth *four and one-third cents* and *digestible* carbhydrates *nine-tenths of a cent* per pound, irrespective of the material from which they were derived; provided only that such material contained nothing injurious to animal life.

These prices, when applied to the digestible food in pure corn meal, make its value one dollar per hundred pounds, agreeing almost exactly with present market rates.

It remains now to show that these assumed prices are correct; that for milk production *digestible food* in dried stalks and in corn ensilage, is quite as valuable as that from corn meal.

Corn meal, corn stalks and corn ensilage, resemble each other in this respect, from 86 to 94 per cent of their digestible food belongs to the class carbhydrates. *Clearly, therefore, the study of the feeding values of these materials is practically reduced to a comparative test of their carbhydrates.*

The examination of any ration, actually fed and admitted to be suitable for dairy herds will show that each cow consumes daily, approximately, three pounds of digestible proteine, and thirteen pounds of digestible carbhydrates including fat.

Such a ration cannot be made from either the meal, the dried stalks or the ensilage, used alone. The best effects of either of these materials will be seen when it is combined with products rich in proteine.

In the comparative feeding trials here reported, a mixture of thirty pounds of brewers' grains, and three pounds of oil meal, was selected to furnish the proteine and fat; it furnished also considerably less than one-half of the necessary carbhydrates, the balance being supplied in the different rations by the dried corn stalks, by a mixture of corn stalks and corn meal, and by corn ensilage, as the following tabular statement shows:

Ensilage, Corn Stalks and Corn Meal—Percentage of Digestible Food furnished by each in the following rations.

Pounds of digestible	Ensilage ration.			Dried corn stalk ration.			Corn meal and dried corn stalk ration.					
	Total food in ration.	Food from 40 lbs. of corn ensilage.	Percentage of food furnished by 40 lbs. of corn ensilage.	Total food in ration.	Food from 12 lbs. of dried corn stalks.	Percentage of food furnished by 12 lbs of dried corn stalks.	Total food in ration.	Food from 5 lbs. of corn meal.	Food from 6 lbs. of dried corn stalks	Percentage of food furnished by 5 lbs. of corn meal.	Percentage of food furnished by 6 lbs of dried corn stalks.	Total percentage in corn meal and corn stalks.
Fat.....	.67	.09	**13.4**	.68	.10	**14.7**	.80	.17	0.50	21.3	6.3	**27.5**
Proteine...	2.85	.50	**17.5**	2.71	.36	**13.3**	2.86	.33	.18	11.5	6.3	**17.8**
Carb-hydrates..	11.92	6.92	**58.0**	11.58	6.58	**56.8**	11.36	3.07	3.29	**27.0**	**29.0**	**56.0**

Composition of Experimental Rations.

Pounds of digestible	Ensilage ration.			Dried corn stalk ration.			Corn meal and dried corn stalk ration.				Barn ration.
	40 lbs. of corn ensilage.	30 lbs. of brewers' grains.	3 lbs. of linseed meal.	12 lbs of dried corn stalks.	30 lbs. of brewers' grains.	3 lbs. of linseed meal.	5 lbs. of corn meal.	6 lbs. of dried corn stalks.	30 lbs. of brewers' grains.	3 lbs. of linseed meal.	29 lbs. brewers' grains. 4.5 " corn meal. 3.2 " cotton seed meal. 1.3 " linseed meal. 1 8 " wheat chaff. 10.0 " corn ensilage.
Fat.....	.09	.41	.17	.10	.41	.17	.17	.05	.71	.17	.79
Proteine...	.50	1.44	.91	.36	1.44	.91	.33	.18	1.44	.91	3.51
Carb-hydrates,	6.92	4.01	.99	6.58	4.01	.99	3.07	3.29	4.01	.99	11.22

The aim of this feeding trial is to show that, for milk production, the digestible carbhydrates in field corn stalks and in corn ensilage are quite as valuable as those in corn meal.

For this purpose cows V and VI were fed a ration in which 57 per cent of the carbhydrates were derived from *dried field corn stalks.* The average daily yield per cow, for fifteen days was *twenty-five and two-tenths pounds of milk.*

During the next period of fifteen days the ration for cows V and VI was so changed that 29 per cent of its carbhydrates were derived from *dried corn stalks*, and 27 per cent from *corn meal.* The average daily yield of milk remained unchanged at *twenty-five and two-tenths pounds per cow.*

The digestible carbhydrates in corn meal and corn stalks, therefore, do not differ from each other in their effect upon the quantity of milk secreted.

In the ration for the third period, which embraced nearly five weeks, both corn meal and dried corn stalks were replaced by *corn ensilage.* During this period the average daily milk yield from cows V and VI was again practically unchanged—*twenty-five and one-tenth pounds per cow.*

The digestible carbhydrates in corn ensilage, therefore, can be substituted for those in corn meal and corn stalks without affecting the flow of milk.

This trial was repeated upon two other cows, numbers III and IV. For a period of five weeks their ration derived 29 per cent of its carbhydrates from dried corn stalks, and 27 per cent from corn meal. The average daily yield of milk was *twenty-three and seven-tenths* pounds per cow.

In the next period of six weeks, corn ensilage replaced both the corn meal and corn stalks.

The average daily yield of milk from cows III and IV upon this ration was *twenty-three and two-tenths pounds.* Compared with the previous record, it shows a daily decrease of one-half pint only per cow.

This second trial, therefore, substantiated the conclusions already reached.

Details are tabulated below. Black faced type have been used to aid in comparing the yield from the same herd when fed upon different rations.

Ration.	Number of Cow.	Milk Yield per Day in Pounds for Periods with Different Rations.						
		Jan. 17 thro' Jan. 31.	Feb. 1 thro' Feb. 15.	Feb 16 thro' Mar. 3.	Mar. 4 thro' Mar. 22.	Mar. 23 thro' Apr. 16.	Apr. 17 thro' May 7	May 8 thro' June 3.
Barn.								
29 lbs. brewers' grains.	V	33 0						
4.5 " corn meal.	VI	29.8						
3.2 " cotton seed meal.								
1.3 " linseed meal.	Average	31.4						
1 8 " wheat chaff								
10.0 " corn ensilage.								
Corn Stalk.	V	.....	27.2					
12 lbs. dried stalks.	VI	.....	23.2					
30 " brewers' grains.								
3 " linseed meal.	Average	.....	25.2					
	V	.....	.....	27.4				
	VI	.....	.....	23.0				
Corn Meal and Corn Stalks.	Average	.....	.....	25.2				
5 lbs. corn meal.								
6 " dried stalks.	III	.....	.....	27.8	28.5			
30 " brewers' grains.	IV	.....	.....	18.4	20.1			
3 " linseed meal.								
	Average	.....	.....	23.1	24.3			
				23.7				
	V	.....	.....	.....	26.0	28.5		
	VI	.....	.....	.....	22.3	23.3		
	Average	.....	.....	.....	24.2	25.9		
Corn Ensilage.					25 1			
40 lbs. ensilage.								
30 " brewers' grains.	III	.....	.....	.....	.....	26.6	26.0	
3 " linseed meal.	IV	.....	.....	....	.....	19.7	20.2	
	Average	.....	.....	.....	.....	23.2	23.1	
						23.2		
	V	.....	.....	.....	.....	.....	.....	25.5
	VI	.....	.....	.....	.....	.....	.....	23.2
Corn Ensilage.	Average	.....	.....	.....	.....	.....	.....	24.4
40 lbs. ensilage.								
30 " brewers' grains.	III	.....	.....	.....	.....	.....	.....	25.0
3 " linseed meal.	IV	.....	.....	.....	.....	.....	.....	20.0
	Average	.....	.....	.....	.....	.....	.....	22.5
Barn.....	Average of Eight Cows.			20.0	19.7	19.7	19.8	19.9

From these results the conclusions can be fairly drawn that, *for milk production, the digestible carbhydrates from corn meal, corn stalks and corn ensilage can replace each other without affecting the quantity of the product; consequently, they are, for this purpose, of equal value.*

Two possible sources of errors affecting this conclusion were recognized when the experiment was planned.

1. The station's ration may have contained a large excess of digestible food; in which case the substitution of corn meal for indigestible and worthless material might have been without effect upon the milk yield.

2. Other conditions, temperature, weather and so forth, may have exerted a favorable influence in increasing the yield from an inferior ration.

The first point was checked by noting the milk yield from cows V and VI while they were fed upon the "barn ration." The average daily yield for fifteen consecutive days was then *thirty-one and four-tenths pounds per cow.* This yield immediately fell when these two cows were fed the corn stalk ration, the average for fifteen consecutive days being then only *twenty-five and two-tenths* pounds per cow, a decrease of 20 per cent, which, however, is easily understood when it is seen that the corn stalk ration contained 23 per cent less proteine, and 29 per cent less fat than the "barn ration."

This comparison indicates clearly that the station's rations did not contain an excess of digestible proteine and fat, for it is positively shown that an increased milk yield of 20 per cent resulted from an increased consumption of these compounds.

The carbhydrates in the station's rations agree substantially with the quantities dictated by practice, ranging from eleven and four-tenths to eleven and nine-tenths pounds per cow; from four to eight per cent less than German feeding standards demand.

Regarding the second point, viz: that the yields of milk might have been favorably influenced by unknown conditions, but little need be said; as a check upon such possibilities, eight cows, fed upon the barn ration, without changes, for one hundred and nine consecutive days, prove by the regularity of their milk flow that they at no time were affected by such influences, consequently it is safe to assume that the experimental cows in the same barn were also unaffected.

The milk record of these eight cows is included in the last table.

IV.

HOW MUCH POTASH, PHOSPHORIC ACID AND NITROGEN IS REMOVED FROM AN ACRE BY A CROP OF FIELD CORN, AND HOW MUCH BY A CROP OF FODDER CORN?

The determinations of *nitrogen*, *phosphoric acid* and *potash*, were made in the samples of ensilage, also in those of the corn meal,

corn stalks and corn cobs, secured in duplicate as has been already described.

The total weights of nitrogen in the crops do not differ materially from each other, being eighty-two pounds in the field corn, and seventy-nine pounds in the fodder corn.

The same close agreement also exists in the case of phosphoric acid; forty-five pounds being found in the field corn, and forty-two and one-half pounds in the fodder corn.

The only noticeable difference occurs in the relative amounts of potash, the fodder corn utilizing eighty-five pounds, and the field corn fifty-three and five-tenths pounds.

The total value of the plant food in each crop at present market rates, shows a remarkable agreement; that from the fodder corn being $21.94, and that from the field corn $21.34 per acre.

Practically, therefore, there would be no difference in the expense of replacing the plant food removed by each crop.

The details are tabulated as follows:

Quantity and Value of Plant Food Removed per Acre, by Crops of Field and Fodder Corn.

GREEN FODDER CORN.

	Total yield per acre.	Percentage of			Pounds per acre of			Value per acre of			Total value.
		Nitrogen.	Phos. acid.	Potash.	Nitrogen.	Phos acid.	Potash.	Nitrogen.	Phos. acid.	Potash.	
								$	$	$	$
Fodder corn.....	28,200 lbs.	0.28	0.15	0.30	79.0	42.3	84.6	15 80	2 54	3 60	21 94

FIELD CORN.

Shelled corn	3824 lbs.	1.38	0.71	0.40	52.7	27.2	15.3	10 54	1 63	65	12 82
Dried stalks	4041 "	0.65	0 37	0.82	26.3	15.0	33.1	5 26	90	1 41	7 57
Cobs.....	950 "	0.31	0.27	0 50	2.9	2.6	4.8	58	16	21	95
Total	.....	....	....	....	81.9	44.8	53.4	16 38	2 69	2 27	21 34

CONCLUSIONS.

The aim of the above work was to compare field corn and fodder corn, regarded simply as sources of winter food for dairies.

It has been shown that large areas of land, under identical conditions as regards manure, soil and season, averaged per acre sixty-eight and three-tenths bushels of *shelled corn*, and *two* and *two-tenths tons* of *dried stalks*, against *fourteen* and *one-tenth* tons of *green fodder corn*.

A comparative feeding trial has shown that in *quality* the digestible food secured in corn meal, corn stalks and fodder corn is of equal value for milk production. It has also been shown that as regards the expense of replacing the plant food removed from the fields, no practical difference exists between the crops.

In quantity of digestible food and expense incurred in gathering and preserving it, the balance is, however, at present, decidedly in favor of the field corn.

APPENDIX.

Annual Report of the State Pomological Society.

1887-8.

FARMINGTON, June 1, 1888.

Hon. Z. A. GILBERT,

Secretary Maine Board of Agriculture:—

I have the honor to transmit herewith for publication in the annual report on the agriculture of Maine, the transactions of the Maine State Pomological Society for the year 1887–8.

Yours Respectfully,

D. H. KNOWLTON, *Secretary.*

MAINE STATE POMOLOGICAL SOCIETY.

Transactions for the Years 1887-8.

As introductory to the present volume of proceedings, justice to the society compels us to state that neither the present secretary or his predecessor was in office during the entire period covered by the transactions. The records, however, are complete and in excellent condition, but necessarily many items of interest to Maine fruit-growers are omitted, inasmuch as they came only to the knowledge of the former secretary, who has so ably edited the transactions of the society during the several years he held the office.

It is an object of congratulation that our society has been able to do so much for the promotion of the interests which it represents. Since its organization fruit-growing in Maine has developed into one of the most profitable of all the various industries connected with agriculture. Little by little the society has taught the people, first the importance and possibilities of fruit-growing in Maine, and then, through the medium of its papers and discussions, from actual experience, it has been the most reliable and progressive teacher of the science of fruit-growing. Then, again, at its annual exhibitions which have grown in importance and magnitude it has spread out before the people of the State such tables of fruit as can be found in few other States. These exhibitions, quite as much as any other work of the society, have illustrated just what the society is doing. Largely through its influence many a hillside has been covered with apple trees, and the garden acre has increased in importance because of the great abundance and variety of fruit it affords the families of thousands of our people.

The society has also done very much to encourage the culture of flowers, and some of the most interesting papers read at our winter meetings have been upon flower culture.

The society is not large, neither is it possessed of large resources. As will be seen from the treasurer's report its receipts are comparatively small when the magnitude of the work it is doing is correctly measured. It might profitably do more if its resources were larger, and possibly the time may come when its exhibitions will be more complete and all its work made more effective by the use of ample means.

OFFICERS FOR 1888.

President.

CHARLES S. POPE, Manchester.

Vice Presidents.

D. J. BRIGGS, South Turner.

O. C. NELSON, New Gloucester.

Secretary.

D. H. KNOWLTON, Farmington.

Treasurer.

A. S. RICKER, Turner.

Executive Committee.

The President and Secretary, *ex-officio;* L. H. Blossom, Turner Centre; J. W. True, New Gloucester; H. W. Brown, Newburg.

Trustees.

Androscoggin	County,	J. A. Briggs, Turner.
Aroostook	"	E. W. Merritt, Houlton.
Cumberland	"	S. R. Sweetser, Cumberland Centre.
Franklin	"	M. C. Hobbs, West Farmington.
Hancock	"	Charles G. Atkins, Bucksport.
Kennebec	"	E. A. Andrews, Gardiner.
Knox	"	Elmas Hoffses, Warren.
Lincoln	"	H. J. A. Simmons, Waldoboro'.
Oxford	"	C. H. George, So. Paris.
Penobscot	"	J. E. Bennoch, Orono.
Piscataquis	"	H. L. Leland, E. Sangerville.
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.

Committee on Nomenclature.

Hon. Z. A. Gilbert, North Greene; W. P. Atherton, Hallowell; D. P. True, Leeds Centre.

Committee on New Fruits.

D. H. Knowlton, Farmington; T. M. Merrill, New Gloucester; L. H. Blossom, Turner.

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
Boardman, Samuel L ..... Augusta
Briggs, D. J ..... South Turner
Briggs, John ..... Turner
Burr, John ..... Freeport
Carter, Otis L ..... Etna
Chase, Henry M ..... North Yarmouth
Chase, Martin V. B ..... Augusta
*Clark, Eliphalet ..... Portland
Cole, Horatio G ..... Boston, Mass.
Crafts, Moses ..... Auburn
*Crosby, Wiliam C ..... Bangor
Dana, Woodbury S ..... Portland
DeRocher, Peter ..... Bradentown, Fla.
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
Gardiner, Robert H ..... Boston, Mass.
George, C. H ..... Hebron
Gilbert, Z. A ..... North Greene
*Godfrey, John E ..... Bangor
Hanscom, John ..... Saco
Harlow, S. C ..... Bangor
*Harris, N. C ..... Auburn
Harris, N. W ..... Auburn
Harris, William M ..... "
*Hersey, T. C ..... Portland
Hopkins, Miss S. M ..... Gardiner
Hoxie, James S ..... North Fairfield
Hobbs, M. C ..... West Farmington
Hoyt, Mrs. Frances ..... Winthrop
Ingalls, Henry ..... Wiscasset
*Jewett, George ..... Portland
Johnson, Isaac A ..... Auburn
Jordan, Francis C ..... Brunswick
Knowlton, D. H ..... Farmington
Low, Elijah ..... Bangor
Low, S. S ..... "
Lapham, E A ..... Pittston
McLaughlin, Henry ..... Bangor
*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
Purington, E. F ..... West Farmington
*Richards, F. G ..... Gardiner
Richards, John T ..... "
Ricker, A. S ..... Turner
*Richardson, J. M ..... Gardiner
Roak, George M ..... Auburn
Robinson, Henry A ..... Foxcroft
Rolfe, Samuel ..... Portland

*Deceased.

LIFE MEMBERS—CONCLUDED.

Sawyer, Andrew S.....Cape Elizabeth
Sawyer, George B .....Wiscasset
Shaw, Stillman W .....West Auburn
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
Stanley, O. E..... "
Strout, S. F.....West Falmouth
Strattard, Mrs. A. B .....Monroe
Sweetser, S. R.....Cumberland Center
*Taylor, Joseph .....Belgrade
Taylor, Miss L. L....(Lakeside) Belgrade
Thomas, William W., Jr.....Portland
Tilton, William S .....Boston, Mass.
True, Davis P.....Leeds Center
Varney, James A ....The Dalles, 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 FOR 1887.

Baker, John C .....Lewiston
Bartlett, M. E... .....East Dixmont
Blossom, G. W .....Turner
Blossom, Leander H.....Turner Centre
Brown, Henry W .....Newburg
Butler, Alonzo.....Union
Carey, Henry S..... Topsham
Carpenter, James M .....Pittston
Chase, George C..... Lewiston
Chase, George M ..... "
Chipman, A. B.....New Gloucester
Colby, Mrs. D. H .....Lewiston
Cook, Silas W..... "
Douglass, O. G..... "
Dunton, John..... "
Espionett, B..... "
Grant, Mrs. Benson..... "
Gurney, L..... ...Hebron
Harmon, G. H .....Auburn
Haskell, Mrs. W. S..... Turner
Hawkins, M. P.....Auburn
Hibberd, C. H .....Lewiston
Hoyt, Mrs. Helen .....Winthrop
Johnson, Henry.....Turner
Johnson, Mrs. James.....Auburn
Judkins, H. P .....Chesterville
Keith, W. H.....Winthrop
Keith, Walter L ..... "
Kenniston, E. H .....Simpson's Corner
King, S. M.....South Paris
Lombard, T. M.....Auburn
Manson, Arthur.....East Dixmont
Merrill, I. C.....Lewiston
Merrill, T. M.... .....West Gloucester
Nelson, O. C .....Upper New Gloucester
Nowell, F. E.....Fairfield
Penley, Mrs A. W.....Auburn
Perkins, L. J .....Portland
Prince, Rufus .....South Turner
Ring, Miss Abbe E. .....Richmond
Ring, Miss Cora E ..... "
Robbins, Mrs. M. L... .....Winthrop
True, J. W .....New Gloucester
Waterman, I. T.....East Auburn
Wharff, W. R ....Gardiner
Wright, Fred.. ..... Bath

ANNUAL MEMBERS, 1888.

Averill, David C.....Temple
Berry, M. B .....Mew Gloucester
Chandler, S. H. C..... "
Davis, Jacob L..... Upper Gloucester
Fogg, Chas. N .....New "
Hackett, E. C.....West Gloucester
Merrill, T. M.....West Gloucester
Nelson, O. C.....Upper "
True, John W .....New "
Ward, John H..... " "
Whittier, Phineas.....Farmington Falls

D. H. KNOWLTON, *Treasurer*,

In Account with Maine State Pomological Society, for the Year 1887.

Dr.		Cr.	
To cash in treasury Dec. 31, 1886	$81 51	By paid secretary's salary	$100 00
Loan, People's Trust Co., Farmington	350 00	" expense	108 50
State Treasurer, bounty for 1886	500 00	" clerk	18 50
Life members' fees	30 00	Treasurer's expense	15 45
Annual members' fees	45 00	Executive committee's expense	86 56
State Agricultural Society	450 00	Stationery, printing and binding	64 63
Interest on permanent fund	13 78	State Fair expense	1 50
Balance due treasurer	2 56	Interest	11 83
		State Ag'l Society for members	5 00
		Permanent fund	7 38
		Note, People's Trust Co., Farmington	300 00
		Note, Wiscasset Savings Bank	200 00
		Premiums, balance 1886,	1 00
		Premiums in full for 1887	552 50
	$1472 85		$1472 85

Financial Condition of the Society Dec. 31, 1887.

Assets.		*Liabilities.*	
Amount due from State Treasurer, bounty for 1887	$500 00	Amount due on loan, People's Trust Company, Farmington	$350 00
Property owned by Society, (estimated)	150 00	Amount due on orders not paid	27 63
Am't on deposit in the Wiscasset Savings Bank to credit of permanent fund	351 78	Amount due treasurer	2 56
Balance due from State Agricultural Society, 1886	45 00		
	$1046 78		$380 19

Permanent Fund.

Dr.		Cr.	
To amount on deposit to credit of fund, Dec. 31, 1886	$344 40	By fees of 88 members to Dec. 31, 1886	$880 00
Amount deposited in 1887	7 38	Fees of 3 members during 1887	30 00
Balance due fund	558 22		
	$910 00		$910 00

D. H. KNOWLTON, *Treasurer*.

Farmington, Feb. 2, 1888.

The foregoing accounts of the Treasurer have been examined and found correct.

New Gloucester, Feb. 24, 1888.

Chas S. Pope,
L. H. Blossom,
J. W. True.
} *Executive Committee.*

Maine State Pomological Society.

Report of the Fifteenth Annual Exhibition Held in Lewiston, September 6, 7, 8 and 9, 1887.

Early in the season the executive committee of our society met with the trustees of the Maine State Agricultural Society, and arrangements were made for a joint exhibition. The terms agreed upon were carried out in good faith by both parties and accordingly the exhibition was held in the exhibition hall on the State Fair Park in Lewiston, September 6, 7, 8 and 9, 1887.

The date for holding the exhibition was too early for a large display of apples, and the condition of the fruit in the State was such that the exhibit in quality was hardly up to our usual standard of excellence. The exhibit however was very good, especially of pears which were large and of excellent quality.

It is to be regretted that several counties were not represented on the exhibition tables. Aroostook, Hancock, Lincoln, Piscataquis and Washington counties made no collective exhibits, which was a matter of general regret, as many were hoping to find fruit from all parts of the State.

It is a cause of regret among our fruit growers that the fruit on exhibition showed unmistakably the increase of the apple maggot (*Trypeta pomonella*) in the State. The fruit showing the presence of the maggot was mostly of the early varieties, and of these the sweet and sub-acid varieties were the most affected. The insect seems to shun the acid fruits. Some of the winter apples also showed the presence of the insects. In some parts of York, Cumberland, Sagadahoc, Kennebec and Androscoggin counties the insect has already become a great pest, and its increase may well be regarded with alarm. So little is known of the insect and its habits

that as yet no means for controlling its ravages have been discovered. Some of our more advanced fruit growers are of the opinion that spraying the trees with arsenical preparation will hold them in check. Other fruit growers are feeding the fruit to the stock, hoping in this way to control its ravages.

The floral exhibit was large and arranged with excellent taste. The greenhouse exhibits made by John Burr of Freeport and G. M. Roak of Auburn were large and their respective displays were made in the most artistic manner.

In several cases the committees of award expressed preferences for exhibits where no premiums were offered by the society. These do not appear in the report as published.

The date of the exhibition was so early in the autumn it was not expected there would be any display of open air grapes. From several towns, however, there were very good exhibits which the committee deemed worthy of premiums. The general rules, and list of premiums as awarded follow.

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 Augusta, personally or by letter, until September 3d, and after that at the Exhibition Building at the Park, up to and including the first day of the exhibition, Tuesday, September 6th.

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 post-office 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 committees 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 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.

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 when 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 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, 1888, 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 Awarded at the Annual Exhibition.

Class I—APPLES.

FIRST DIVISION.

RULES. Entries for all premiums in this division must consist of five specimens of each variety exhibited, and (except Nos. 18, 19, 20 and 21) of at least twenty correctly named varieties, and not more than forty. 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.

AWARDS. For best general exhibition of apples, grown by the exhibitor in any part of the State: Miss L. L. Taylor, Lakeside, $12.00; W. R. Wharff, Gardiner, $8.00; J. Pope & Son, Manchester, $5.00.

Best general exhibition of apples grown by the exhibitor in Androscoggin county: D. J. Briggs, South Turner, $8.00; L. H. Blossom, Turner Center, $6.00; D. P. True, Leeds Center, $4.00.

For the same in Cumberland county: S. R. Sweetser, Cumberland Center, $8.00.

For the same in Franklin county: E. F. Purington, West Farmington, $8.00; H. P. Judkins, Chesterville, $6.00.

For the same in Kennebec county: C. I. Perley, Seward's, $8.00; R. H. Gardiner, Gardiner, $6.00.

For the same in Knox county: Alonzo Butler, Union, $8.00.

For the same in Oxford county: C. H. George, Hebron, $8.00; Lemuel Gurney,, $6.00; S. M. King, South Paris, $4.00.

For the same in Penobscot county: H. W. Brown, Newburg, $8.00; J. E. Bennoch, Orono, $6.00; E. H. Kenniston, Simpson's Corner, $4.00.

For the same, Sagadahoc: Fred Wright, Bath, $8.00; H. S. Cary, Topsham, $6.00.

For the same, Somerset county: F. E. Nowell, Fairfield, $8.00; J. S. Hoxie, North Fairfield, $6.00.

For the same, Waldo county: Arthur Mansur, East Dixmont, $8.00; M. E. Bartlett, East Dixmont, $6.00.

For the best five varieties of autumn apples: S. W. Shaw, Auburn, $3.00; C. H. George, Hebron, $2.00; S. R. Sweetser, Cumberland, $1.00.

For the best five varieties of winter apples: D. J. Briggs, South Turner, $3.00; F. E. Nowell, Fairfield, $2.00; C. H. George, $1.00.

For the best eight varieties for home use: C. H. George, Hebron, $3.00: S. W. Shaw, Auburn, $2.00; S. R. Sweetser, Cumberland, $1.00.

For best collection of crab apples: I. C. Merrill, Lewiston, $1.00; E. H. Kenniston, Simpson's Corner, 50c.

SECOND DIVISION.

RULES. 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.

AWARDS. American Golden Russet: H. P. Judkins, $1.00; I. T. Waterman & Son, 50c.

Baldwin: C. H. George, $1.00; D. W. Pulsifer, 50c.

Benoni: S. R. Sweetser, $1.00; F. E. Nowell, 50c.

Black Oxford: D. W. Pulsifer, $1.00; Rufus Prince, 50c.

Dean: Miss L. L. Taylor, $1.00; J. E. Bennoch, 50c.

Duchess of Oldenburg: J. Pope & Son, $1.00; N. W. Harris, 50c.

Early Harvest: C. H. George, $1.00.

Early Strawberry: James Bickford, 50c.

Fall Harvey: H. P. Judkins, $1.00; C. H. George, 50c.

Fall Pippin: R. H. Gardiner, 50c.

Fameuse: I. T. Waterman & Son, $1.00; J. E. Bennoch, 50c.

Franklin Sweet: G. W. Blossom, $1.00; C. I. Perley, 50c.

Garden Royal: C. I. Perley, $1.00; E. F. Purington, 50c.

Gravenstein: I. T. Waterman & Son, $1.00; J. Pope & Son, 50c.

Grimes' Golden: J. S. Hoxie, $1.00; J. E. Bennoch, 50c.

Hightop Sweet: E. F. Purington, $1.00; S. M. King, 50c.

Hubbardston Nonesuch: J. W. True, $1.00; Miss L. L. Taylor, 50c.

Hunt Russet: D. P. True, $1.00; Master Walter L. Keith, 50c.

Jewett's Fine Red: F. E. Nowell, $1.00; S. R. Sweetser, 50c.

King of Tompkins County: C. I. Perley, $1.00; F. E. Nowell, 50c.

King Sweeting: E. F. Purington, $1.00; Miss L. L. Taylor, 50c.

Large Yellow Bough: Walter L. Keith, $1.00; E. F. Purington, 50c.

Moses Wood: C. I. Perley, $1.00; Miss L. L. Taylor, 50c.

Mother: S. R. Sweetser, $1.00; J. W. True, 50c.

Northern Spy: M. C. Hobbs, $1.00; S. R. Sweetser, 50c.

Orange Sweet: I. T. Waterman & Son, $1.00.

Peck's Pleasant: J. S. Hoxie, $1.00; R. H. Gardiner, 50c.

Pomme Royale: C. H. George, $1.00.

Porter: D. W. Pulsifer, $1.00; E. G. Woodside, 50c.

President: L. H. Blossom, $1.00; I. T. Waterman & Son, 50c.

Red Astrachan: E. H. Kenniston, $1.00; C. I. Perley, 50c.

Red Canada: R. H. Gardiner, $1.00; C. H. George, 50c.

Rhode Island Greening: C. H. George, $1.00; W. L. Keith, 50c.

Rolfe: S. R. Sweetser, $1.00.

Roxbury Russet: D. W. Pulsifer, $1.00; C. I. Perley, 50c.

Stark: L. H. Blossom, $1.00.

Sops of Wine: M. C. Hobbs, $1.00; L. H. Blossom, 50c.

Somerset: Miss L. L. Taylor, $1.00; F. E. Nowell, 50c.

Starkey: C. I. Perley, $1.00.

Talman Sweet: H. P. Judkins, $1.00; D. P. True, 50c.

Tetofsky: J. S. Hoxie, $1.00; L. H. Blossom, 50c.

Wagener: N. W. Harris, $1.00; T. M. Lombard, 50c.

Wealthy: S. R. Sweetser, $1.00; Thurston Lombard, 50c.

William's Favorite: Miss L. L. Taylor, $1.00; I. T. Waterman & Son, 50c.

Winthrop Greening: F. E. Nowell, $1.00; W. L. Keith, 50c.

Yellow Bellflower: R. H. Gardiner, $1.00; D. H. Knowlton, 50c.

Crab Apples: T. M. Lombard, $1.00; L. Gurney, 50c.

Fall Orange: S. M. King, $1.00.

Ben Davis, J. W. True, $1.00.

Class II.—PEARS.

For best general exhibition of pears: L. J. Perkins, Portland, $10.00; John Dunton, Lewiston, $8.00; C. I. Perley, Seward's, $5.00.

Best five autumn varieties: G. C. Chase, $3.00; S. W. Shaw, $2.00.

Best single autumn variety: D. P. True, $2.00; J. E. Bennoch, $1.00.

Best single winter variety: J. E. Bennoch, $2.00; D. P. True, $1 00.

Bartlett: T. M. Lombard, $1.00; C. H. Hebbard, 50c.

Belle Lucrative: W. L. Keith, $1.00; S. Rolfe, 50c.

Beurre d' Anjou: G. W. Blossom, $1.00; Rufus Prince, 50c.

Beurre Bosc: S. Rolfe, $1.00.

Beurre Hardy: D. P. True, $1.00.

Beurre Superfin: S. Rolfe, $1.00; D. P. True, 50c.

Beurre Clairgeau: S. Rolfe, $1.00; G. W. Blossom, 50c.

Beurre Diel: S. Rolfe, $1.00; D. J. Briggs, 50c.

Buffum: S. W. Shaw, $1.00; D. P. True, 50c.

Clapp's Favorite: D. J. Briggs, $1.00; John Dunton, 50c.

Doyenne Boussock: S. Rolfe, $1.00; C. I. Perley, 50c.

Duchesse d' Angouleme: G. C. Chase, $1.00; S. W. Cook, 50c.

Eastern Belle: J. E. Bennoch, $1.00; J. S. Hoxie, 50c.

Flemish Beauty: I. T. Waterman & Son, $1.00; E. F. Purington, 50c.

Glout Morceau: D. J. Briggs, $1.00.

Goodale: Miss L. L. Taylor, $1.00; G. W. Blossom, 50c.

Howell: S. Rolfe, $1.00; Rufus Prince, 50c.

Lawrence: John Dunton, $1.00; G. W. Blossom, 50c.

Louise Bonne de Jersey: G. C. Chase, $1.00; J. E. Bennoch, 50c.

Marie Louise: S. Rolfe, $1.00.

Nickerson: J. E. Bennoch, $1.00; H. P. Judkins, 50c.

Seckel: S. W. Shaw, $1.00; D. J. Briggs, 50c.

Sheldon: W. L. Keith, $1.00; Miss L. L. Taylor, 50c.

Swan's Orange: S. W. Shaw, $1.00; J. E. Bennoch, 50c.

Souvenir du Congres: S. Rolfe, $1.00; L. H. Blossom, 50c.

Urbaniste: S. Rolfe, $1.00.

Vicar of Winkfield: S. W. Cook, $1.00.

Class III.—GRAPES.

For best exhibition grown with artificial heat: J. C. Baker, Lewiston, $6.00.

Best cluster Black Hamburg, Wilmot's Hamburg or Victoria Hamburg, J. C. Baker, $1.00.

White Muscat: J. C. Baker, 50c.

Muscat Hamburg: J. C. Baker, 50c.

White Chasselas: J. C. Baker, $1.00

Lady Downes: J. C. Baker, $1.00.

Buchland Sweet Water: J. C. Baker, $1.00.

White Nice: J. C. Baker, $1.00.

Red Chasselas: J. C. Baker, 50c.

Chasselas Musque: J. C. Baker, $1.00.

Hartford Prolific: J. S. Hoxie, $1.00.

Moore's Early: J. S. Hoxie, $1.00; L. Gurney, 50c.

Lindley: J. S. Hoxie, $1.00.

Concord: Henry Johnson, 50c.

Delaware: J. S. Hoxie, $1.00; E. F. Purington, 50c.

Blood's Seedling: E. F. Purington, $1.00; J. W. True, 50c.

August Pioneer: C. I. Perley, 50c.

Class IV.—PLUMS.

For best general exhibition, John Dunton, Lewiston, $6.00.

Best single variety: M. P. Hawkins, $2.00; D. P. True, $1.00.

Green Gage: E. F. Purington, $1.00.
Yellow Gage: F. E. Nowell, $1.00.
Coe's Golden Drop: G. C. Chase, $1.00.
Yellow Egg: L. Gurney, $1.00.
Lombard: I. T. Waterman & Son, $1.00; I. C. Merrill, 50c.
Magnum Bonum: M. P. Hawkins, $1.00.
Washington: E. F. Purington, $1.00.
Smith's Orleans: E. F. Purington, $1.00.

Class V.—MISCELLANEOUS.

For best peck of cultivated cranberries: M. E. Bartlett, East Dixmont, $2.00; Henry Johnson, Turner, $1.00.

For best sample of nursery apple trees: I. C. Merrill, Lewiston, $2.00; D. J. Briggs, South Turner, $1.00.

For best nursery grape vines: C. I. Perley, Seward's, $1.00; D. J. Briggs, 50c.

For best variety of canned fruits, preserves, pickles, made and put up by the exhibitor: Mrs. Benson Grant, Lewiston, $3.00; Mrs. James A. Johnson, Auburn, $2.00.

For best specimen canned peaches: Mrs. D. H. Colby, $1.00; Mrs. Benson Grant, 50c.

Canned strawberries: A. B. Chipman & Son, $1.00; Mrs. D. H. Colby, 50c.

Canned raspberries: Mrs. Frances Hoyt, $1.00; A. B. Chipman & Son, 50c.

Canned cherries: Mrs. E. F. Purington, $1.00; Mrs. Frances Hoyt, 50c.

Canned quinces: Mrs. D. H. Colby, $1.00.

Canned tomatoes: Mrs. D. H. Colby, $1.00.

Preserved quinces: Mrs. D. H. Colby, $1.00; Mrs. Frances Hoyt, 50c.

Preserved apples: Mrs. M. L. Robbins, $1.00; Mrs. D. H. Colby, 50c.

Preserved plums: Mrs. Frances Hoyt, $1.00.

Preserved pears: Mrs. Frances Hoyt, $1.00; Mrs. D. H. Colby, 50c.

Preserved strawberries: Mrs. Benson Grant, $1.00; Mrs. E. F. Purington, 50c.

Preserved raspberries: Mrs. Benson Grant, $1.00.

Preserved currants: Mrs. D. H. Colby, $1.00; Mrs. Frances Hoyt, 50c.

Preserved cherries: Mrs. E. F. Purington, $1.00; A. B. Chipman & Son, 50c.

Best jar assorted pickles: Mrs. D. H. Colby, $1.00; Mrs. Frances Hoyt, 50c.

Best bottle tomato catsup, Mrs. A. W. Penley, $1.00; Mrs. D. H. Colby, 50c.

Best jar quince jelly: Mrs. Frances Hoyt, $1.00.

Apple jelly: A. B. Chipman & Son, $1.00; Mrs. M. L. Robbins, 50c.

Grape jelly: Mrs. Benson Grant, $1.00; Mrs. D. H. Colby, 50c.

Currant jelly: Mrs. D. H. Colby, $1.00; Mrs. Benson Grant, 50c.

Strawberry jelly: Mrs. Frances Hoyt, $1.00; Mrs Benson Grant, 50c.

For best ten pounds evaporated apples, W. H. Keith, $3.00.

Class VI.—FLOWERS.

FIRST DIVISION.

RULES. In this class no article can be entered for more than one premium. All plants and flowers entered for premium must positively be in their places at the exhibition room on the second day of the Fair at 10 o'clock A. M.

AWARDS. Best display of cut flowers filling not less than one hundred phials: Mrs. Charles Stanley, Winthrop, $10.00; Miss Cora E. Ring, Richmond, $8.00; Miss Abbie E. Ring, Richmond, $5.00

For best exhibition roses: G. M. Roak, $5.00; John Burr, $3.00.

Dahlias: Mrs. Charles Stanley, $2.00.

Chinese pinks: Mrs. W. S. Haskell, $1.00; Mrs. Charles Stanley, 50c.

Asters: Mrs. Charles Stanley, $1.00

Pansies: Mrs. W. S. Haskell, $1.00; Mrs. Charles Stanley, 50c.

Zinnias: Miss Cora E. King, $1.00; Mrs. Charles Stanley, 50c.

Phlox Drummondii: Mrs. Charles Stanley, $1.00; Miss Cora E. Ring, 50c.

Stocks: Mrs. Charles Stanley, $1.00.

Balsams: Miss Cora E. Ring, $1.00; Mrs. Charles Stanley, 50c.

Petunias: Mrs. Charles Stanley, $1.00.

Gladiolus: Mrs. Charles Stanley, $2.00.

Verbenas: Miss Cora E. Ring, $2.00; Mrs. Frances Hoyt, $1.00.

SECOND DIVISION.

For best pair parlor bouquets: John Burr, $1.00; Mrs. Chas. Stanley, 50c; Julia E. Briggs, 25c.

For best pair wall bouquets: Mrs. Frances Hoyt, $1.00; Miss Cora H. Stanley, 50c.

For best pair hand bouquets: John Burr, $1.00; Miss Cora H. Stanley, 50c; Mrs. Frances Hoyt, 25c.

Floral pillow: G. M. Roak, $5.00; John Burr, $3.00; Mrs. Chas. Stanley, $2.00.

Floral design (professional): John Burr, $8.00; G. M. Roak, $5.00.

Floral design (amateur): Mrs. Chas. Stanley, $5.00.

Floral wreath: Mrs. Frances Hoyt, $2.00; Mrs. Chas. Stanley, $1.00.

Best dish of cut flowers: Mrs. Frances Hoyt, $2.00.

Fancy basket: Mrs. Cora H. Stanley, $2.00; Mrs. Frances Hoyt, $1.00.

Dried grasses: Mrs. Frances Hoyt, $2.00; Mrs. Chas. Stanley, $1.00.

Everlasting flowers: Mrs. Frances Hoyt, $1.00; Mrs. Chas. Stanley, 50c.

THIRD DIVISION.

For best exhibition of greenhouse plants: John Burr, Freeport, $15.00; G. M. Roak, Auburn, $10.00.

Ferns: John Burr, $3.00; G. M. Roak, $2.00.

Geraniums: John Burr, $2.00; G. M. Roak, $1.00.

Begonias: John Burr, $2.00; G. M. Roak, $1.00.

Coleus: John Burr, $2.00; G. M. Roak, $1.00.

Specimen plant of Dracæna, John Burr, 50c.; double geranium, G. M. Roak, 50c.; double geranium, John Burr, 25c.

Specimen plant of single geranium, John Burr, 50c.; G. M. Roak, 25c.

Salvia splendens, G. M. Roak, 50c.; John Burr, 25c.

Foliage begonia: John Burr, 50c.: G. M. Roak, 25c.

Flowering begonia: John Burr, 50c.; G. M. Roak, 25c.

Coleus: G. M. Roak, 50.; John Burr, 25c.

Fuchsia: G. M. Roak, 50c.; John Burr, 25c.

Carnation: John Burr, 50c.; G. M. Roak, 25c.

Single pot plant: G. M. Roak, $1.00; John Burr, 50c.

Special floral design: Lucy B. Burr, $3.00; Geo. M. Chase, $2.00.

PROCEEDINGS OF THE JOINT MEETING

OF THE

MAINE STATE POMOLOGICAL SOCIETY

AND THE

MAINE BOARD OF AGRICULTURE,

HELD IN

Town Hall, New Gloucester, February 22, 23 and 24, 1888.

Proceedings of the Joint Winter Meeting.

By special arrangement with the Secretary of the Maine Board of Agriculture, the Executive Committee of the Maine State Pomological Society perfected a programme for a joint winter meeting representing both organizations. At first there were some doubts as to the desirability of the union, but the grand success achieved by the meeting, fully justified the wisdom of the Executive Committee in uniting with the Secretary of the Board of Agriculture in arranging for the meeting. Our Society represents one of the most important agricultural industries in the State, and it is a matter of special congratulation that we may call the Board of Agriculture to our aid.

A cordial invitation was extended to the Society by the citizens of New Gloucester to hold the winter meeting in their beautiful Town hall. In accordance with the invitation, the joint winter meeting was held in New Gloucester, February 22, 23 and 24, 1888.

Mr. J. W. True of New Gloucester, was chairman of the local committee of arrangements, and under his direction the details were carefully provided for. The citizens were generous and hospitable to their numerous visitors, and were throughout enthusiastic attendants upon the meetings. The public meetings were largely attended, and the proceedings were more generally reported in the papers of the State than any of our former meetings. It is well to note here that this is a strong indication of the increased interest in fruit and horticultural affairs in our State.

FIRST DAY—FORENOON.

The opening exercises were informal, the time being devoted to arranging of the fruit tables, and other details connected with the meetings.

AFTERNOON.

The Society met at 2 o'clock, and was called to order by the President, Mr. Chas. S. Pope of Manchester. The Secretary, Mr. Samuel L. Boardman of Augusta, made an informal report of the Society's transactions during the past year. The Treasurer, Mr. D. H. Knowlton of Farmington, presented his annual report and it was accepted. The Society then proceeded to the election of officers for the current year. The Treasurer's report and the names of the officers elected may be found in previous pages of the transactions.

EVENING SESSION.

The meeting was called to order by the President, at 7 o'clock, who introduced Charles P. Haskell, Esq., of New Gloucester, who delivered the address of welcome.

ADDRESS OF WELCOME.

By CHARLES P. HASKELL.

Mr. President: You are doubtless aware that you have assembled for your winter meeting in the oldest county in the State, save one, a county in which agriculture has always been one of the leading industries.

At first it may have been in a measure unscientific, and of a kind common to primitive New England, yet ever sustained and carried on by a people who recognized the great fact that everywhere improved methods of agriculture kept even pace with increasing intelligence and civilization.

In the improvement which has been made in farm stock, from the old fashioned scrub that stood bristling and shivering in the cold, to the sleek thoroughbred that now stands contentedly ruminating in his bedded stall; in laying aside the rude implements of husbandry of former days, to give place to the well nigh perfected ones of the present; in all the progress that agriculture has made in New England; in every department that tended to lessen human labor and at the same time make it more remunerative; in all the mighty march of progress which the century has shown, not only in agriculture, but in everything that contributes to the sum of human welfare, in-

deed in thought itself, the people of Cumberland county have ever striven to keep well abreast the spirit of the times. Her agriculture has always been diversified in its nature, and among these diversities the orchard was early cultivated; if not for its market fruit, perhaps for the good cheer that was sure to flow from the cider mug which by the blazing fire, graced many a chimney corner in the jolly old days of yore.

Now that steam has annihilated distance so that the ocean itself forms no barrier in seeking a market, the growing of fruit in many localities has come well to the front as one of the leading agricultural industries.

The pioneers of this town were not all of that class of whom it has been written,

> "The average farmer we have oft' been told
> Was not a fruit grower in the days of old,
> And if by chance a fruit should be found
> So venturesome to occupy his ground,
> 'Twas there by accident not by design
> And yielded fruit fit only for the swine."

Instead, early in the development of our farming industry an orchard, though of natural fruit, was considered a necessary adjunct to nearly every farm.

While in summer some of our hills and plains are covered with the beautiful green of the forest, well nigh primeval, to be changed in time to the glories of autumnal tints, and our valleys are cheered with waving fields of grass and grain, waiting for the coming of the even clipping scythe; yet many a hillside is covered with blooming orchards, a good earnest of a rich autumnal fruitage, not of the kinds familiar to the fathers in the days of their youth, but of varieties the most approved; an indication of some of the progress which fruit culture has made. In this community, in any community where the fruit of the orchard has become a source of material profit, the planting and growing of trees to a healthy maturity, the warding off of insects ever increasing in numbers and kinds, the harvesting, storing, packing and marketing of fruit, climatic conditions, adaptability of soils to different varieties, cannot fail to be subjects of deep and abiding interest; for a thorough understanding of the underlying principles applicable to fruit growing is essential to the highest success.

Though the apple holds so prominent a place in our consideration, we would not ignore the necessity of more light in regard to the

cultivation of the small fruits, now that the cultivated fruit of the garden, instead of the wild product of the fields and the pastures is relied upon as the main source of supply.

Neither would we forget the necessity of more encouragement in regard to the planting of shade and ornamental trees in which there is so much utility and beauty combined; their protecting arms affording shelter alike from the cold of winter and the heat of summer, adding attractiveness to the home, to places of public resort and beautifying the public ways.

Any action which will direct public attention more fully to the planting of shade and ornamental trees we would hail with delight, as a step worthy the last half of the nineteenth century, a step forward on the true line of progress.

Mr. President: We cannot pass unnoticed that other department which it is the pleasure of your society to encourage, the cultivation of flowers.

We are told that Soloman in all his glory was not arrayed like the plain lily of the field.

The fullness of the beauty, the power for good there is in flowers no tongue as yet has been able to fully tell. Their presence adds pleasure in the house of feasting, and softens sorrow in the house of mourning; we see them in the church to draw the thoughts of the worshippers nearer to the Great Giver of all good, their presence in and around the school-room has turned the stubborn youth from ways of rudeness and idleness to the paths of obedience and study; when seen in or about the home, be it in the sunshine of summer or through the blasts of winter, they tell of purity of thought, nobleness of spirit and culture there.

Flowers soften the hard spots, smooth the rough edges of human nature and lift humanity to a higher and nobler life.

With Longfellow can we say,

"In all places, then, and in all seasons,
Flowers expand their bright and soul-like wings,
Teaching us by most persuasive reasons,
How akin they are to human things."

Realizing the extended influence which this Society exerts upon every question that engages its attention, and anticipating much that will result in great good from the light thrown upon the subjects considered at these meetings, it is a pleasant duty for me, in behalf of the farmers and people of New Gloucester to extend to you, Mr. Presi-

dent, and to the members of the Society over whose deliberations you preside, and to all, who by their voice or presence contribute to the success of these meetings, a most cordial welcome.

Feeling doubly assured that the good results sure to flow from this joint winter session, will be not only local, but as far reaching as the confines of our noble State, I say to you again, Mr. President, in behalf of my fellow citizens, Welcome, thrice Welcome to our town.

In behalf of the society D. H. Knowlton, Secretary, responded to the address of welcome. Vice President O. C. Nelson assumed the chair and introduced Mr. Charles S. Pope, who proceeded to deliver his annual address.

ANNUAL ADDRESS.

By CHARLES S. POPE, President.

Ladies and Gentlemen: Members of the State Pomological Society, I do not propose to weary you at this time with a tedious dissertation but simply review a little our work for the past year and make a few suggestions, and then give the time to essays and discussions that will prove more interesting.

Our annual exhibition in September in connection with the State Agricultural Society, we think, gave good satisfaction to all concerned. The display was much better, in some respects than we anticipated at so early a date. Fruits of all kinds were unusually forward. Our late winter apples were of fair size and quite well colored and even. Some varieties of out-door grapes were on exhibition which appeared to be fully ripe. Perhaps the detriment to the fruit department arising from the early date was fully compensated by an unusually good display of flowers.

At our earnest solicitation Mr. Geo. M. Roak of Auburn and Mr. John Burr of Freeport kindly consented to send in fine collections of greenhouse plants, which added very much to the attractiveness of the hall. At a meeting of the trustees of the State Agricultural Society in January, they made us a liberal offer to again join our exhibition with theirs; it remains for you to decide whether it is for the interest of the society to accept their terms. Should you decide to do so, we think it necessary to make a change in our by-laws. It is impossible in our connection with the agricultural society to give our annual members the privileges at our exhibition which our by-laws, as they now stand, specify.

We learn that the officers of the Agricultural Society have set apart a room to be used during the next Fair for evening meetings, and that they invite the Pomological Society to occupy one evening. Should you decide to hold an exhibition in connection with them, we think the executive committee should not fail to accept the invitation and make early arrangement for an attractive programme. The policy of holding our annual exhibition in the same location for a long term of years, demands our consideration. From a pecuniary point of view the present arrangement may seem best for the Society, but as we aim to benefit the whole State, would it not be decidedly better to visit some of the more remote parts occasionally? Could we not afford to make some sacrifice to meet with those who share to a greater or less degree our interest in these matters, but cannot arrange to meet us here?

We think our premium list needs some revision but would not recommend any radical changes. We would suggest as an advantage, the offering of a liberal premium for the best essay on some horticultural topic, to be read at our winter meeting.

We would call attention especially to the necessity of revising the Society's catalogue of fruits. In our opinion, many of the new varieties with which our State is being flooded, should have a place in the list, so that our people may know what to discard as well as what to plant; and when any variety of fruit is condemned, the reason for the same should be given. There are so few of our prominent fruit-growers in attendance at this meeting that it would be impossible to do the work thoroughly now, had we the time to do so. To make a reliable list we should have the opinion of hundreds of our best fruit-growers in all parts of the State, and this can be accomplished only by correspondence; therefore, it seems to us highly important that a committee be appointed whose duty it shall be to perfect some system and make up a catalogue which shall be forwarded to the Secretary in season to be printed in our next report.

An effort has been made for several years to secure a reduction of postage on seeds, bulbs and plants by mail. Unquestionably the present rate is excessive as compared with that of other countries; we pay just four times as much postage on this class of mail matter as do our Canadian neighbors, while in England a package of eleven pounds requires a little more than half the postage we pay on a four pound package. As we are all directly interested in this matter, I suggest that we take such action as shall throw the weight of our influence to favor the passage of the bill now pending in Congress.

In reply to my recent request to contribute a paper for this meeting, one of our fruit-growers answered, that he had nothing new to offer, that it would be simply a repetition of what had already been said. In our opinion new phases of the problem arise year by year. A few years ago our answer to the question, where shall I plant an orchard? would have been, on some high hill. As to variety? The Baldwin every time for profit. We should now answer, on moist soil—well underdrained if necessary—and we should hesitate before recommending the Baldwin in many localities, on account of its liability to attack by "apple scab." The Ben Davis apple that a few years ago was condemned by our own Society, is now thought by many of our prominent orchardists to be the coming apple for shipment.

Within a few years, it has been pretty thoroughly demonstrated that the greater part of damage from codling moth can be prevented by the use of arsenical poisons, and we have good reason to hope scientific research will soon discover some methods of defending our orchards from the destructive apple maggot and "apple scab." With reliable remedies for these three enemies of the fruit grower, orcharding would receive a fresh impulse, and we hope it will shortly be our privilege as a society to aid in disseminating among our people such methods.

The address of President Pope was referred to a special committee consisting of D. H. Knowlton, S. L. Boardman, and L. H. Blossom.

Mr. W. P. Atherton of Hallowell, then read the following paper:

UTILITY vs. SENTIMENT.

By W. P. Atherton.

Ladies and Gentlemen: I have selected this topic for a short paper not because I feel competent to deal with it, but because it appears to me to be one that needs some attention. It is not a question with me whether it ought to be introduced on this occasion, or whether it ought to be discussed or not just now; as to that it matters not, but it does matter in the education of the race whether the mind be guided rightly or wrongly. It does matter in the education of our sons and daughters whether their minds be bent wholly in the direction of the one or the other, or, neither warped by sentiment nor degraded by utility they shall receive enough of good from both to make a perfect harmony.

My subject, then, should be utility and sentiment for, like theory and practice they should go hand in hand. If bread and butter be uppermost or the acquisition of wealth alone is to be considered why then sentiment may take a back seat, if it may not withdraw from the contest altogether, and let utility hold supreme sway over the mind as it certainly will when the tendency is wholly in that direction. Frugality, economy and the acquisition of wealth are all good things in their way but carried to that extreme whereby the mind becomes so poisoned as to be devoid of all sentiment, so that the planting of a shade tree by the roadside, a fruit tree in the garden, a vine by the door are not to be considered for a moment or, if considered, only as time worse than wasted, then I say that a mind of a Schiller or a Gœthe wholly engrossed in song, poetry and sentiment were far better.

The French as a people are noted for their economy, but to such a degree has a certain class among them carried their economical habits, that they can talk of nothing else but how to save here and how to scrimp there till the caller is utterly disgusted. It may be better to pay one's debts rather than to increase them, and extravagance in any people is not to be commended, but that spirit of improvement which is born of sentiment, nourished and sustained by sentiment is to be commended where it leads one to a higher plane of thought and action.

Looking at the question then solely from the point of sentiment without entertaining here all that is meant by æsthetics or æsthetic culture, it would seem that farm-life demanded something more than the holding of the plow, the swing of the scythe, or the crack of the whip. These and other acquisitions have their place; they are the necessary and useful accompaniments to a life on the farm, and the more skilled one becomes in their use, the better; still, something more is required, something that will make that life more attractive, more highly appreciated, nay, I might say, more endurable. For to many is it not true that farm life is simply endured? It is not loved or appreciated as it ought or might be were farmers properly educated. We cannot have in the country the tense thought, the stirring activities, the mighty pulse-beats and heart-throbs of the great cities, nor do we need them, but we can emulate and follow the growing sentiment of our rural cities and villages, a sentiment which annihilates the old dogmas of seclusion, high board fences and multifarious shrubbery and substitutes therefor the neatly

trimmed lawn, and with vine and plant and flower so arranged as to give a fine setting, like a picture both beautiful and restful. The time was when the lilac, the cinnamon rose and the Boston pink played a prominent part in the adornment of country homes, but that day has long since passed and it is only because these things were perennial, hardy, deep rooted and strong rooted, like the ideas that once prevailed, that we have any evidence that a house once stood on the forsaken and otherwise barren spot we gaze upon. How many such spots there are and what sad thoughts arise as we view these tender reminders of the old homesteads, now deserted or utterly gone to ruin.

I remember of climbing a few years ago one of those immense foothills to old Abram in company with a friend, and how upon our descent my companion pointed out to me such a spot and said "here stood a house once and here was born and reared a lad who is now one of the most noted preachers in the land. You would scarcely think," said he, "that such a man could spring from such a place." "No, I should not," I answered. The land was rough, stony and rugged, and yet we know that often it is from just such rugged surroundings that some of our most prominent and useful men have had their birth and earliest education. What part in the wide range of sentiment the lilac, the cinnamon rose or the Boston pink could have played in the lives of some of our greatest preachers, poets and authors we cannot tell; we know only that they did act a part and for the influence they did have let us ever hold them in sweet remembrance.

We do not care to perpetuate a dead past. Times have changed. The sentiment of the age is progressive. The spirit of improvement which animates the mind of the village or city resident and prompts him to remove old fences and everything that is offensive or unsightly; to grade his grounds evenly; to lay them out artistically and adorn them with a few choice plants and flowers, is manifestly on the increase and is certainly to be commended by every lover of the beautiful.

That there is a growing sentiment in the rural districts of removing altogether road-side fences and clearing the lands adjacent to the highways of all unsightly bushes, stones, weeds and rubbish, and cultivating the same in connection with previously enclosed lands is very evident. I say growing, for such is the fact. In some towns

this sentiment has made but little if any lodgment, in some it is growing very slowly while in others it has made marked progress. Among the latter class may be mentioned the town of Sidney, which, if not the banner town in this respect, is at least a strong leader. In this town, both on the river and middle roads, great progress has been made and scores of farmers have removed their road-side fences and cultivated the land close to the highway. The initial steps, steps absolutely necessary though hard to be taken, in the march of improvement, of removing the fences and subduing the land have here been taken, but, alas! must I say, it, too many never get beyond the *utility* idea. I can almost see some old farmers now (I could if it was July) jumping up and down, clapping their hands and chuckling inwardly and saying to themselves, "Why! why didn't we think of this thing before; here is a lot of land that in the past has absolutely run to waste or fed my neighbors' cattle and we have lost hundreds of dollars in hay, grain and potatoes; but we are not going to lose any more; this land is rich from the washings of the highway, or from decayed rubbish or from long enforced idleness; moreover, in the future it will not cost us much to keep up its fertility for in most cases it is gratuitously and permanently enriched and now we are going to make the most of the privilege." So they have reasoned, and thus it is with a few rare exceptions that the grand opportunity has been seized upon and utilized. They have raised hay, grain and potatoes and instead of shade or ornamental they have set out apple trees.

In one sense the proprietors of these lands have a perfect right to do as they please with them, and in another sense they have no right to ignore or trample upon the rights of the public; one of those rights, of course, is the "right of eminent domain" in which not sentiment but utility plays a leading part; another of those rights is the sense of what is proper which includes poetry, sentiment and art. Now there may be both sentiment and poetry in tasseled corn, in waving grain and in blossoming rows of potatoes, but I prefer to read poetry of that kind a little farther off when riding in the country, and if it was put to a vote whether the lands not actually needed to keep in repair the highways should be wholly utilized in the growing of crops or, in part, devoted to sentiment by planting of ornamental trees, I think that nine-tenths of the public would agree with me that the latter course was the one to be pursued.

A great deal more might be said upon this subject but time and space forbid. It will only be necessary to add that while the farmer cannot be and is not expected to be a landscape gardener, he may yet do much to make his home much more than what it now too frequently is, simply an abode to eat, sleep and die in, and having in fact none of those essentials most desirable in a true home. It is the little things of life too often overlooked, such as the planting of a shade tree, the planting of a plum, a pear or a cherry tree, a small space devoted to small fruits or the cultivation of a few choice flowers, which play an important part in the moulding of character and add a grace and charm that nothing else can give.

This paper is written not alone for the farmer but for all the village residents who have the means and taste to improve their homes and more particularly their immediate surroundings. In all such improvements such as the removal of old fences and the grading and adornment of the grounds, sentiment should not hold supreme sway but be so subordinated to the utility idea that a sufficient space of ground be reserved, where possible, to the planting of fruit trees and to the cultivation of a few plants of the most desirable of the small fruits.

DISCUSSION.

Sec. GILBERT. There is nothing that gives pleasanter thoughts of the industry and good taste of a community than road-sides well cleared up and door-yards well kept and ornamented by thrifty people. The contrast is very marked when reaching another district, where with difficulty one finds his way through the highway. Utility and beauty may be combined by planting fruit trees about the home and along the highway. Nothing is more beautiful than a well formed fruit tree growing in a well-kept lawn, or along the highway. Give us men of utility combined with beauty.

Mr. ATHERTON. It was the custom in my boyhood to clear the land of stones and dump them with other rubbish into the highway. In later years I have done what I could to clear away the same stones from the highway, and now the land where the stones were is productive, and cheering to my view. The street commissioner came up my way and dug the stones out of the highway and threw them along the roadside. The highway officials are guilty of defacing a good many road-sides in this way. I had to scold them a good deal before they would quit this kind of work.

Mr. PARKER HOLT, New Gloucester. I like the idea of planting apple trees along the highways, but it is our duty to teach the farmers to prune up their apple trees. Cut the limbs twice a year with a fine-tooth saw about six inches from the trunk; then after the limb is off cut again close and carefully to the tree trunk. The wound will heal quickly and the trees will bear large and beautiful fruit.

Mr. J. W. TRUE, New Gloucester. I do not favor the planting of fruit trees along the highways. They branch out low down, and I very much prefer the planting of shade trees. If the valuable trees now growing along the highways could be marked in some way so the surveyors and road commissioners would not cut them down indiscriminately, it would be a great advantage.

Mr. ATHERTON. I believe more attention should be given to the cultivation of flowers among the farmers. They should be growing about every country home.

Mr. CHARLES P. HASKELL. I am interested in planting trees along the highways. The apple tree is beautiful in its place; the shade tree is beautiful in its place; where is the place of each? The broad branches of the elm extend wide over the lawn, and it is longer lived than the apple tree. I have cleared away the rubbish thrown upon the road-side by the road commissioners, but I think the owners of land should act together in this matter. It would be an excellent idea if towns were required to line the highways with shade trees. The only way to keep rubbish out of the highways is to educate the people up to the beautifying of the highways.

Mr. LEWIS F. STARRETT, Rockland. I am in favor of setting trees along the highways. I think there should be a variety of the trees growing in our forests. There is no necessity of planting trees in lines. The grower may shape a tree much as he may choose by judicious pruning and training.

Hon. P. M. AUGUR, Connecticut. I am in full sympathy with the ideas advanced upon utility and sentiment. The boys and girls should be taught to love their own homes the best of any place, and the adorning of homes by shade trees has very much to do with the development of that love. A few years since I removed several rods of fence along the street, and it became town talk. At first the stock troubled us a little and we were obliged to yard the cattle once or twice, but now the grass grows beautifully along the road-side and our mowing machine is run up to the road without difficulty.

The President appointed D. J. Briggs, Turner, T. M. Merrill, New Gloucester, and A. E. Andrews, Gardiner, a committee on fruit exhibit.

THURSDAY FORENOON.

The meeting was called to order by President Pope at 9.30 o'clock.

Mr. Dunbar not being present, a paper prepared by him on "Plums and Their Culture," was read by Mr. M. C. Hobbs of West Farmington.

PLUMS AND THEIR CULTURE.

By E. W. DUNBAR.

In writing upon the cultivation of any crop, I feel somewhat diffident, from the fact that there are so very many different things to be considered. When I find a certain variety of fruit growing successfully in one locality, and within a few miles from it the same variety, under similar cultivation, almost a failure, I feel cautious about recommending any particular varieties or special modes of cultivation. In this paper I think it best to confine myself, principally, to my own experience, the varieties grown, soil, dressings and some observations in connection with the subject, rather than to advance theories.

I have cultivated plums more or less for thirty years. My first effort was upon a farm in the town of Nobleboro', some six miles north of this place. I had but few trees. I had excellent success with the Imperial Gage grafted upon the old Damson stock dressed wholly with stable manure. I disposed of this farm and moved to the village of Damariscotta, and in 1872 purchased a residence together with quite a lot of land. Upon examining the soil, I found it similar to that upon which my plums were raised on the farm, and so decided to set a few trees to see what they would do in my new location. My success with the Imperial Gage induced me to select some of the same variety. I set this and the Lombard. They grew well and commenced to fruit in three years. In 1879 they bore the best crop which was very abundant. Upon one limb, not over three-fourths of an inch in diameter, on a space of one foot, I counted fifty-six well grown plums.

In 1875, I set some McLaughlin and Bradshaw, and have continued setting a few trees nearly every year since. To this time, I have lost but two trees, one, a McLaughlin, died of a bark disease; the other, a Washington, died, I think, by too much pruning. The latter has not been a success with me.

VARIETIES NOW IN CULTIVATION.

Imperial Gage, Lombard, Bradshaw, McLaughlin, Green Gage, Purple Gage, Niagara, Wheat (on pomegranate stock), Smith's Orleans, Moore's Arctic, River's Blue Prolific, Reine Claude, Shropshire Damson, Yellow Egg, Victoria and Magnum Bonum, Saunders, and Shippers' Pride ordered to set the coming spring. From this list the following have done the best with me: Imperial Gage, Lombard, Bradshaw, Niagara and Wheat. A few have not been set long enough to fruit, therefore I cannot state what they will do. I have a very favorable opinion of the Niagara. It seems hardy, fruit large and abundant, and one tree which has been set seven years has entirely escaped the black knot. Moore's Arctic is doing well in this county. I have two trees. They were set three years ago. They fruited the second year and show some good qualities, being hardy, fair growers, and have fruited two years in succession. Why this variety was dropped by this society from its list of specials, I never knew; but probably by the suggestion of some who had more experience in its cultivation than myself.

THE BLACK KNOT.

This I find the most difficult to control of any thing in cultivating this crop. I do not know how to prevent it. All I do for it is to cut off the knots as soon after they appear as possible, and dress the trees heavily, thus giving them a thrifty growth. Of all the varieties I have grown, the Niagara is the only one that has entirely escaped this disease, and I find this variety affected in a garden not over thirty rods from mine. I have cut off the limbs of some that were very largely covered with the knots and they are sending out new branches; whether they will ever recover and become worth cultivating remains to be seen. During fourteen years I have not lost a tree by this disease. Much has been written upon this disease, many remedies prescribed; but I believe it is now generally admitted by cultivators that no remedy has ever been discovered.

If we knew the cause it might lead to a remedy. Years ago, when the soil was new, this disease was unknown. May it not be that some element that the soil then contained has become exhausted, and if we could learn what it was, by supplying it, might we not prevent the disease? Perhaps this may be worth looking into by some who have the means and time to experiment in this direction.

CURCULIO.

This is an insect about five-sixteenths of an inch long, of a brown color with spots of white, yellow and black. They appear as soon as the fruit forms, and continue until about the middle of August. It is supposed to fly from the ground. They puncture the plum and lay an egg in the wound. The gum oozes out, the egg hatches, the worm eats into the fruit which falls from the tree, usually before it is half grown. Some cultivators recommend jarring the tree suddenly in the morning and evening, when they will fall and can be caught on a cloth and destroyed. I have been troubled but little with this pest. I keep hens in the orchard, and no grass or weeds grow around my trees. I think the hens and clean cultivation will prevent nearly all trouble from this insect.

SOIL.

I have grown all of my plums upon a clay-loam, well drained naturally, and quite moist. I do not wish to be understood that plums cannot successfully grow upon other kinds of soil, nor that my manner of cultivation is the best. It is simply my experience, and my success has been very satisfactory.

DRESSING.

The principal dressing used has been stable manure and sea-weed applied liberally in autumn, wood ashes and salt in the spring. I am satisfied that fruit growers, generally, do not use dressing with the liberality they should. In the spring, as soon as the ground becomes in condition to work, I fork around my trees, being careful not to interfere with the roots, mixing the dressing that was placed around them in the previous autumn with the soil, and at the same time apply wood ashes and salt. Droppings from the hen-house and pig-pen will not injure them.

PRUNING.

When I set the trees, I cut out all superfluous branches, and cut back all limbs to form a well proportioned head. For the first three or four years I cut back about one-fourth to one-half of the previous year's growth, always in the spring before the trees start to grow. They should not be pruned at the trunk, but at the end of the branches. No *stone* fruit will bear pruning as we prune the apple and pear.

The plum in this part of the State is the most profitable fruit grown. There is always a demand, at a good price, while apples and pears are a drug in our markets about every other year.

Mr. D. P. True of Leeds Centre read the following paper:

NOTES ON PLUM CULTURE.

By D. P. TRUE.

The cultivation of this fruit has been attracting more attention among fruit-growers of late; and its great productiveness and early bearing added to its ready sale in our local markets go a long way towards making it a very popular fruit. Having given the plum considerable attention for the past fifteen years I will give a brief statement of facts and theories. My first experience was with an old Damson tree that had struggled on for years, a disgrace to the premises. I began to try all the remedies that I could hear of with very poor success until I commenced to cut off the black knot, and the tree was so badly diseased that it was finally cut down; but it sent up vigorous shoots that have borne many bushels of plums; but the best was that it learned me this lesson, that by care and constant cutting I could *control* the black knot. Black knot in those days was thought to have been caused by an insect, but late years our scientists have established the fact beyond a doubt that the cause is of a fungoid nature, and the disease is spread from tree to tree by spores that float in the air, and that being the case, it would seem that to burn the black knot is as important as to cut it off, as it is claimed that it will send off its spores just as readily after being cut as before.

In plum-growing a proper location is of greater consequence than in most other fruits for the following reasons: In the first place

the plum is quite tender and ought to have a good elevation so that our hard winters will not affect too seriously; next choose a heavy compact soil, as a loose sandy one is the favorite home of the curculio, but with the hard compact soil, he cannot burrow easily. Do not locate your plum orchard too near other lands that you do not control, as plum or cherry trees that are covered with black knot will surely work the ruin of your own.

The curculio has not seemed to do so much damage in Maine as in other states; and it does not seem to trouble large orchards so badly as it does isolated trees; but I think most highly of a hard stony soil as a protection from this troublesome pest. Some advise grafting the plum on the Canada stock, but the trouble is that the scion will outgrow the stock and the first full crop of plums are more than likely to prove its last; the union is so poor that it will fail to bear its burden and it will split down. First class trees on plum roots will give the best satisfaction in the long run. The plum tree will not require much pruning, although it will stand a large amount of cutting well. Give good cultivation and the plum will make a very rapid growth. Salt is a very good fertilizer for the plum tree and a liberal use of wood ashes on all our old worn out soils are a necessity. It would be well to shorten in the more vigorous shoots early in the autumn, as this will cause the tender wood to harden and prevent winter killing. Trees that bear too heavily should be thinned as they are very liable to break down with their burden of fruit. The plum unlike the pear, to be the most delicious should be ripened on the tree; but in order to stand transportation well, will have to be picked before they are fully ripe. Our local markets require all the plums that we have been able to raise, and no doubt they will for some time to come.

In making selection of choice varieties, we have quite a list to select from. As for my own experience, I would place McLaughlin first for quality and size; it is quite hardy and has proved a good bearer with me; but it has this disadvantage, it will not bear transportation well like the Lombard. Smith's Orleans is a plum of good size and quality, productive, and very hardy. The Shropshire Damson is a plum of good quality and very productive, a very popular market variety; it has sold for better prices with me than any other variety. The Yellow Gage is a fine eating variety but has the bad habit of rotting on the tree; some years it has proved an entire failure from this cause. The Lombard is very productive but lacks

the fine quality of the best varieties; it will bear transportation better than any other, making it a very valuable market variety.

DISCUSSION.

Mr. L. F. STARRETT. We have a remedy for the curculio, which my mother has tried for two or three years, and in which she has great faith, and I think it is well worth a trial by any who are troubled with this insect. It is to take good dry corn cobs, soak them in well sweetened water and hang them on the trees. The theory is that the curculio is attracted by the sweetness and lays her eggs in the cob instead of in the plum. The cobs can then be destroyed and with them the young insects. My mother saw this method advocated in a newspaper and tried it and it has worked well. She had not had much success with her plums, but this plan has worked so well that she has continued to use it every year.

Mr. NELSON. I would like to ask Mr. True what amount of salt it will do to put around a plum tree.

Mr. TRUE. I do not pretend to be an expert and I should not dare to fix the amount. I think it would be very dangerous to put much salt very near the trunk of a tree. I should use a small amount, comparatively speaking. We all know that too much salt is death to vegetation. But I have been in the habit of using it and have taken it for granted that it was good for my trees.

Mr. NELSON. Why I asked that question was that in 1858, I had twelve nice plum trees that were bearing first rate. I read in some agricultural paper that salt was just the thing to put around them. In clearing out some pork barrels I had about a bushel of salt, and I spread that around these twelve trees, and they never leaved out afterwards.

Mr. MERRILL. Mr. Nelson's experience does not seem to be in harmony with the advice and practice of the great plum-growers of the West, who recommend salt as being very beneficial. In Mr. Nelson's case it seems to have been fatal. I would like to inquire what time of year he applied his salt and how he applied it; whether it was distributed equally over the whole orchard or applied directly about each tree?

MR. NELSON. I will say that I put this around as I poured it out of the pork barrel, brine and salt. Of course it was quite an

amount. I don't know that I was very careful to spread it all over the ground, as I supposed by what I read, that I certainly should have a nice crop of plums the next year. I think it was in November that I put it on. The trees never leaved out after that; it seemed to kill them at once.

D. P. TRUE. I have always been careful not to allow salt to touch the trunk of the tree. I apply brine and salt in about the same amount, in proportion to the number of trees, that Mr. Nelson speaks of, but I take the precaution to dig a small hole and cover the salt afterwards. I am satisfied that too much salt, or a very little salt put directly around the trunk of a tree will be fatal.

MR. AUGUR. We have applied salt to plum trees. How much did you apply to a tree? A bushel to twelve trees would be less than three quarts to a tree. I should have no very great fear to apply that amount of salt to plum trees, if it was thrown quite evenly over the whole ground and without any brine. Brine, a saturated solution of salt, is very strong and if that came in contact with the roots it would be pretty apt to work mischief. I think salt is of such a nature that it should always be used with extreme caution, particularly when it comes in close proximity to the roots. Prof. Johnson, of our State, says there is no plant that needs salt, that it is not a fertilizer; and the question is, what benefit then is salt? There has been an idea, and I entertained it at one time, that salt was valuable as a remedy for the curculio; but I am satisfied that there isn't any ground for that. The amount of salt that it will be safe to use would not be sufficient to destroy the larvæ of the curculio. If it was used in sufficient strength to destroy them, it would be a damage to the tree. But there is this beneficial action to salt, I think: its action as a re-agent in the soil, in its chemical action, and possibly in releasing potash and making it available for the benefit of the plum. A certain amount applied to the soil will increase the crop of beets, onions or potatoes, and I have an idea that it works in the same way with plums; not because the salt is a plant food, but because it brings the other elements of the soil into condition to be available. In a state of solution, as a brine, I should most positively object to using it in any quantity, because it so soon comes in contact with the tissue of the plant, whatever it may be.

There are two or three points in connection with this matter that I will just allude to. Several have spoken of the advisability of

enclosing plum trees in a hen yard. I believe in that most fully. We have an orchard of about an eighth of an acre which we have treated in that way successfully. And so far as the curculio is concerned it has been a perfect success. The only trouble has been over-productiveness; our trees have borne too much.

Now, while you may be able to provide for the most of your trees in that way, you may have a choice tree away by itself that you cannot conveniently enclose in that way, and you may ask if there is any other way to combat successfully with the curculio. Well, the old way of jarring the tree and catching and killing the insects of course is effectual if it is followed thoroughly through the curculio season. But when they have 40 or 50 acres of plums as they do at Seneca Lake and some other points, the aggregate of the expense is large although when you reckon the cost for a single tree it is but little. And there will be certain days when it will be omitted, and the curculio do their work very rapidly when they commence.

There is another remedy which I have a good deal of confidence in and have tried somewhat, and I think, successfully, and that is, at the season when we expect the curculio, to apply some very offensive wash, drenching every tree. For instance, dissolve a pail or two pails of coal tar in forty gallons of water and let it stand a few days. Of course the liquid will be offensive; and the curculio, although he is a hateful fellow, is a little fastidious, and a very offensive smell like that of coal tar, is regarded by many as a very sure preventive. I have considerable faith in it. I would not want to absolutely warrant it, at the same time I have confidence in it. We have used other offensive mixtures, like whale-oil soap, that we have thought efficacious. At all events we have had full crops after doing so.

But there is a more difficult matter that we have to contend with. I was at a meeting of the Massachusetts Board of Agriculture, where Prof. Maynard of Amherst gave a lecture, and I put this question to him, hoping that we should get a satisfactory answer. The question was: "Have you found any absolute prevention or cure for the black knot?" And he said very emphatically, "No." Well, that is a question I would be willing to travel to Chicago and back again to find a satisfactory solution of, an absolute cure or preventive of black knot, of easy application. If there is any such I have not read of it. Cutting off has been recommended. I believe in that. Our Secretary, Mr. Gold, is a deacon of the Congregationalist Church and a strict observer of the Sabbath, but I once heard

him say that if he was standing under a plum tree and saw a black knot coming, even if it was on the Sabbath, he should cut it off and put it in the fire. I think that at sight, where we can, we should cut off the black knot and at once destroy it. That has been my rule and my practice; but, in spite of all, I have to acknowledge that they will beat me, badly beat me; and, to-day, the great dread that I have and the thing that stands in the way of our success in the raising of plums, is the black knot. I almost despair of any absolute remedy; and the question with me now is, what varieties of plums are least subject to it. I was very glad to hear, in regard to the Niagara plum, that it is one. I presume that is correct. The German Prune is another. Though not absolutely free from black knot it is comparatively so. The Imperial Gage is another and Pond's Seedling another. We are very favorably inclined towards Pond's Seedling as a large, beautiful, attractive plum. The McLaughlin has been spoken of and I concur in the estimate of that as being one of the best plums in quality. It is fine.

With regard to the black knot here is another point, and I am looking that way with considerable interest; the Chickasaw varieties, embracing the well-known plums, the Wild Goose, the DeSoto, the Marian and some of those new varieties so far, with me, have shown no disposition to take the black knot. And I think, again, that these varieties of the Chickasaw plum which sometimes fail to bear alone, do much better when planted in proximity to some of the European varieties such as the German Prune, Pond's Seedling. The Wild Goose plum has been regarded as a humbug, and I regarded it so for quite a while. I have a Wild Goose plum now that stands in close proximity between two of the European varieties, and it has borne very satisfactorily. Now, if we can get a cross, a hybrid, which will combine the resisting power to the black knot with some of the excellencies of the European varieties like the McLaughlin, we shall have something valuable. The black knot in our vicinity has been almost universal, and it has been very discouraging in spite of our best efforts to keep it back.

Mr. POPE. Have you had any experience with Moore's Arctic?

Mr. AUGUR. No, sir. I have seen it but haven't it on my land.

Mr. POPE. That is claimed to be exempt from the black knot particularly. I had trees sent from the Woodstock nurseries, and before I had had them two years the two main branches for about

six inches came out with black knot and I have not succeeded in keeping it back.

Mr. AUGUR. I presume many of you know the Hon. J. F. C. Hyde, the agricultural editor of the Congregationalist of Boston. This last summer I was on his land where he has a plum orchard. He has recommended cutting off as the great specific for keeping clear of black knot. When I was on his grounds the black knot was coming out all over his trees, and he said to me, "I give it up, I don't know where to cut unless I cut to the ground." And we have almost had that same experience ourselves. For years and years we said "you can kill it by cutting off at sight," but it has broken out all over and we have been completely set back in all our ideas as to stopping it, and we have cut down a good many trees.

Mr. NELSON. I am very glad to hear Mr. Augur speak of the Wild Goose plum. I have a tree that I have had some twelve years which never has borne a black knot or a plum. I want to ask him what kind of a plum I shall place beside it, or whether I shall put it between two, that I may fertilize it so as to raise some plums from that tree.

Mr. AUGUR. I would like to say to Mr. Nelson that it is barely possible that he may have been served on his Wild Goose as I was. The plum trees that I had for Wild Goose at first were no more like the Wild Goose than a chicken would be like a goose. They were entirely untrue to the name. But we now have the genuine Wild Goose plum. I have regarded the Wild Goose as being an impracticable thing, but I am more and more getting to think that as it grows in proximity with other varieties it may be the means of obviating that difficulty. I do not think they bear as young as other varieties. The Lombard plum you could not keep from bearing if you wanted to. But that is not exactly the case with the Wild Goose. If I were to suggest a mate to plant near the Wild Goose, on the spur of the moment, I would say plant the Lombard near it. It has very abundant pollen, very perfect flowers, and not only that but it is loaded with plums, and if the branches are so that they can interlace I think probably, if Mr. Nelson has a genuine Wild Goose plum tree, he would be very likely to get fruit from it.

Question. What varieties are subject to rot?

Mr. AUGUR. We are troubled considerably in that way. The Lombard is particularly liable to rot. You will often find clusters of plums a foot or fifteen inches long where they touch each other all

through, and in a wet season they will rot. Another point; it is often the case that plums that are punctured by the curculio will hang on and grow almost up to ripening and those will rot. If the plum is punctured so late that the larva of the curculio fails to eat through the stone and the pith, it will hang. And aside from that if the season is hot and wet I think the Lombard plums are apt to rot. The best thing I know is to go over the trees occasionally and pick off all the decaying plums, for where one commences to rot it will cause others to rot.

Mr. D. P. TRUE. I would like to inquire of Mr. Augur if his trees that trouble him with the black knot were near other trees that had been somewhat neglected and suffering badly before you discovered it. I was away from home one summer and the black knot made its appearance slightly and when I got home I discovered a windrow, as you might say, right through my plum orchard where it had seemed to be blown by the wind, and I went right at my trees; some of them I cut severely; the original tree I had to cut down and burn; the others were not so bad. I thought it passed in the air.

Mr. AUGUR. I think it does. It has been correctly stated here that this disease is of a fungoid character and it is carried by spores, and carried considerable distances. We have about an eighth of an acre enclosed with a high fence and we have about twenty different varieties in that orchard; but we had no older trees in the orchard that were affected. I think the two varieties that we have suffered the most from have been the Lombard and the Shropshire Damson. When the excrescence first starts it looks like a fresh growth and it comes out all over the trees almost simultaneously. I found that among the Hudson river plum trees it had been an epidemic and had damaged them to the amount of tens of thousands of dollars. I think it is bad policy to allow old affected trees to stand where you are setting out young trees. Sometimes this pest will come like the scarlet fever or the measles and you hardly know where to trace its beginning.

Mr. NELSON. A gentleman wishes me to inquire, in view of the trouble from curculios and the black knot, what four or five varieties you would recommend as likely to be most successful.

Mr. AUGUR. Among the European varieties I think my impressions agree very nearly with those of Mr. Dunbar. The Niagara is highly esteemed in western New York and I should mark that as one. The German Prune is another which our people esteem very highly.

It has one special merit. Now, the Lombard and a good many other plums when cooked, even with a pound of sugar to a pound of plums, will still be sour. The German Prune is different in that respect; it cooks a good deal sweeter. I would not want to warrant any of these trees to be entirely exempt from the black knot. The Pond's Seedling has succeeded very well in many neighborhoods. It is a large, beautiful plum. It is not exempt from the black knot. The Reine Claude de Bavay is very highly esteemed. It has a most exquisite flavor. The Quackenboss is thought very highly of. It is rather a coarse plum but sweet and very good. It is productive and grows to a good size and looks well. It is grown quite largely up the Hudson and is rather a popular plum.

Mr. KNOWLTON. Are these varieties all hardy as far as you know?

Mr. AUGUR. In our latitude we have not suffered at all from winter killing. I do not know how it would be here.

Mr. MERRILL. I would like to inquire what distance apart Mr. Augur would plant plum trees?

Mr. AUGUR. In the large plum orchards near Geneva, I think they are planted twenty or twenty-five feet apart, but in our little enclosure we put them a good deal closer than that. We did it merely because we wanted to occupy that hen yard to its fullest capacity. When it has borne a full crop it has been a wonderful sight to see the trees universally loaded with fruit.

Mr. POPE. I would like to inquire of Mr. Augur if he has had any experience in shaving off the black knot and applying anything instead of cutting the limb off.

Mr. AUGUR. Yes. If I saw two or three black knots coming out very near the stem of a tree where it would mutilate the tree badly to cut the limbs off I would shave off the knots and then take a woolen rag or something of the kind and rub the shaved surfaces with spirits of turpentine to destroy any roots of the fungus that might remain. But the trouble with me has been somewhat as in attempting to stop a flock of sheep going over a wall. After two or three get over it isn't much use to try to stop them. We have proved that when a tree has become affected with black knot it is liable to go in spite of us.

Mr. POPE. That has been the practice with some of our fruit growers, to shave quite deeply and apply spirits of turpentine.

J. W. TRUE. I should like to know whether the plums recommended would work well in Maine with our length of season.

Mr. AUGUR. Our experience in Connecticut might not apply well here. Your own growers would be a good deal safer advisers than I. And in regard to the Niagara I will say that I only speak of that from reputation, and not from my own experience. The other varieties we have grown. But I hear from various quarters excellent reports of the Niagara plum and have seen trees that impressed me very favorably with the beautiful fruit they bore.

Mr. BLOSSOM. I have been very much interested in the discussion, and I will say to the citizens of New Gloucester that you have had the pleasure of listening to a valuable discussion on this most excellent fruit, which has been brought out since I have been connected with the society.

Mr. Nelson, in his wild goose chase after wild goose plums wants to get the tree to bear. He has been recommended to put some kind of a bearing tree beside it. I should say top graft that tree to some good variety and then he will get some plums out of it.

According to this discussion the best way of escaping the curculio is to enclose the trees in a hen yard, and that not only keeps off the curculio but it keeps the ground enriched. All the fault that system has is that it results in over production. I think we can put up with that if we can only get good plums.

In regard to black knot, some twelve years ago I started a dozen cherry trees and about the same number of plums. The cherry trees I started from three or four old trees all eaten up with black knot. I took the sprouts and set them out and cut the old trees down and burned them up. I don't think last year I found two limbs on my twelve cherry trees that had black knots on them. It was this old fashioned red cherry. I haven't bought any fancy varieties. I like those old fashioned ones. The plum trees, with one exception, the Washington, have also escaped the black knot. On the Lombard, the Imperial Gage, the Pond's Seedling, I never have found a limb of black knot. I set my trees eighteen feet apart. If I was going to set another plum orchard and put a fence around it to keep hens in I don't think I should plant them over twelve feet apart. When they get to interfering with each other I would thin them out.

Mr. AUGUR. I would like to emphasize that point. I think it is an excellent one and I fully concur. He might graft alternate branches with some other variety and in that way get a good inter-

lacing of limbs. I know no shorter way. Then if you fail to get Wild Goose plums you can graft the rest of the top.

Mr. MERRILL. Since plum culture is becoming such an industry in the State I think the question of variety is one of importance. We have settled within a few years that we need Baldwins for apple trees. Now what do we need for plum trees? If we are going to set plum trees for our own family use perhaps a variety of half a dozen would be recommended. But for business we want to know what is the best variety. It has cost us a good deal to find out which was the best variety of apples for us to raise. If we can avoid that expense on the plums it will be a great benefit to those who are interested in this business.

Mr. BLOSSOM. In our markets in Lewiston and Auburn the favorite variety is the Lombard. I don't know as that is the best plum, but so far as my experience goes, it is the easiest plum to raise and it is the best selling plum. If it is the best selling plum and the easiest to raise it is the plum for us to produce mostly. If I were to set out fifty plum trees next spring I should set twenty-five Lombards.

Mr. MERRILL. I think Mr. Blossom later on after a few years of experience will wish that he had planted forty-nine Lombards and one of some other kind, and later on he will say he should have planted fifty Lombards.

AFTERNOON.

The meeting was called to order at 1 30 o'clock, President Pope in the chair.

Hon. Samuel L. Boardman, of Augusta, read the following paper:

TREES AND THEIR USES IN RURAL EMBELLISHMENT.

By SAMUEL L. BOARDMAN.

Men and trees have always been inseparable companions. In the beginning God planted a garden over to the eastward in Eden, where, it may be supposed, it was so planned to command the first rays of the rising sun, and out of the ground of that garden He made to grow every tree that was pleasant to the sight and good for food. It would be foolish and presumptuous to say that man could not exist without trees, because were there no such objects in existence the Infinite Benevolence would supply his wants through some other medium. But constituted as man is, and established as trees and their functions and properties are, it is plain that the present exquisite order and harmony of things in regard to man's welfare, are most intimately and inseparably identified with trees. Thus when we would consider man and his privileges, the amenities and enjoyments that encircle life, the comforts and ornaments of his home, we cannot possibly do so, if we would give all things their fair place, without keeping trees also constantly in mind; and hence from the time when those trees pleasant to the sight were set in the ground over to the eastward in that first garden, down to the newest country home with its finely painted clapboards and row of street maples planted but yesterday, have trees given picturesqueness to the landscape, surrounded man's home with beauty, and been to him everywhere objects of attention, companionship and love. In the landscape trees are indispensable to that high and fine quality of enjoyment which we term picturesqueness. We may look out upon a rocky mountain and pronounce it grand and sublime, but we have little sympathy with its somewhat forbidding grandeur. Infinite reaches of rolling prairie, the soil fertile and covered for miles and miles with rich fields of corn, may give one an idea of agricultural wealth—but in the absence of trees neither view could be called beautiful or picturesque. Trees clothe the mountain-side with loveliness, they break up the outlines of view, and give variety of colors, movement and shadows; they touch the imagination with an agreeable sense of fruitfulness, or, if they be timber or forest trees, with the idea ot nobility and wealth. Indeed trees are to the landscape what living and moving people are to the town, or to the interior of a massive church or cathedral—an element that *may be* dispensed

with, it is true, but if so, it must be done at the expense of the finest and most impressive influences. "The truth is," says Hamerton, "that a solitude is not so solitary if there is a tree it, and if there is a group of trees we feel it to be almost peopled." Indeed I think it will be found true in the experiences of most of us, that those scenes which come home most warmly to our sympathies, and that seem to have a perennial hold upon our hearts, are those that are enriched by the abundance of their trees, shrubs and flowers.

For generations we have been a people of tree destroyers. Our forefathers in clearing their openings wanted not a tree to be left standing about cabin or hovel—there were trees enough everywhere, and of what good were they except for fuel and saw logs? Then down came the trees, log piles were made and burned, and the early settlers seemed in a hurry to rid the ground of every vestige of Nature's most beautiful creation. But we are glad to have lived to a day when a higher and more rational public sentiment pervades our people; when trees are regarded as objects of beauty, deserving our affection and care; when to cut down a beautiful tree is felt to be a kind of slaughter, and to protect them is the sign of a tender and merciful disposition.

In a country of so varied natural beauty as that favored portion of New England in which our homes have been cast—with its diversified landscape, picturesque views of lake and river, hill and valley, with its healthful climate and exceedingly varied and interesting indigenous flora, it should be regarded as a matter of neglect, almost of reproach, if any one buying, building or creating a home for himself and family, should fail to embellish it with some portion of that infinite wealth of beauty and charm connected with the trees and shrubs which may be had almost for the taking and planting. It should be a duty with all citizens in town or country having a small village flat or possessed of broad acres, to adorn them with those objects of perpetual beauty and service which do not decay as do the cottages and halls which they build, but are a constant source of admiration and delight as the years go on; for trees, unlike houses and churches, temples and towers, do not begin to decay so soon as planted, as these other things do so soon as builded, but they grow and flourish throughout the centuries; they give joy and confer happiness upon children's children, they may live to bestow blessings upon strangers, even, and long years afterwards furnish the material

which may shelter other generations in homes built upon the lumber of trees which man, ages past, had planted.

In choosing a site or location for a home, first of all attention should be given to the matter of sanitary surroundings. A healthful situation should be selected. This must afford good drainage, an elevated location, one commanding the sunlight in its fullest scope, and in a position to secure pure air. Next the home grounds should be easy of access, not selected close upon the street, nor yet too far from a good public road, but the buildings should occupy the happy medium. After this comes into the plan a beautiful outlook from window or lawn, commanding fine views of scenery, pleasing vistas through trees, and grounds made beautiful by the abundant planting of tree, shrub and vine. While we in Maine do not possess that extended range of tree growth and beauty which more favored climatic sections of our country can boast, we yet have a long list from which to select; and out of the great variety of trees indiginous to our soil there is comparatively little difficulty in finding beautiful kinds adapted to almost any situation. We have in this State four species of maple, three of ash, four of birch, two of cherry, two of elm, four of poplar, six of oak, and then we have the beech, butternut, linden, hornbeam, mountain ash, and chestnut, besides two pines, two spruces, two balsams, with the hemlock, juniper and larch. To be more particular as to number, I believe our native flora comprises thirty-eight species of deciduous trees, and eight of the coniferous or evergreens—a list from which trees of almost every form, size and color of foliage—whether in June, September or January, may be selected. Indeed, I think too many of us are ignorant of our tree-wealth, and our nurserymen have often sent abroad for trees when we have had much better ones at home. Mr. Egleston, one of the forestry commissioners of the Department of Agriculture says there are not more than fifty species of forest trees in all Europe worth cultivating, while in our own country we have eight hundred species, 250 of which grow to the height of thirty feet, fifty to the height of 100 feet, and of the entire number, fifty are of the coniferous class. A comparison of our own native flora with that of the most favored portion of the old world, the British Isles, would appear greatly to our advantage, if we would take the opinion of a Scotch gardener, who visited this country some three years ago, and who said, writing home to an agricultural journal: "I am amazed at the indifference of the Americans to the

variety and wonderful beauty of their native trees and shrubs. Their nurserymen and landscape gardeners are trying to grow trees of foreign nativity just for the name of it, at a cost of many failures and disappointments when they have better kinds all about them at home." So high a recommendation of our tree beauty, from such a source is surely worth heeding.

The scope of this paper forbids any reference to details of planting, so far as mere labor is concerned. I will only say that out of the above list are to be obtained trees that will grow almost anywhere, if taken up at the proper time in spring or fall and removed from the forest to the home grounds with care, properly set, and after being set not neglected, until they are able to take care of themselves. So far as possible the same conditions should be obtained upon the home grounds, for a tree removed from the forest, as those to which it had been accustomed; and while it is not necessary to depend upon the foreign nursery for our ornamental any more than for our fruit trees, it is true that trees from a nursery, having been two or three times transplanted and having an abundance of fibrous roots, bear removal better than trees from the natural forest. But if selected from the forest care should be observed to take them from the edge of the wood, rather than in its depths. They are more symmetrical and bear transplanting better. Choose small trees —they are usually of more perfect shape and in removing them one is sure to take up a greater proportional share of roots than with trees which are larger.

Of its own species or variety a tree for ornament should be as near perfect as it is possible to find one in half a day's hunt about the woods and pastures, one embodying the decided characteristics of the species to which it belongs, straight of trunk, symmetrical in outline and beautiful from any point of view. A tree should never be planted for shade or ornament which we will ever become tired of looking at. It is true a crooked tree with dense foliage on one side, and open branches on another will serve the purpose of shade, but it will never serve that higher one of ornament. So long therefore as the same tree may combine both elements, that of humble service and of queenly beauty, be sure to select that which represents the two qualities.

In planting trees about home grounds of moderate extent it is generally the better rule to have each tree depend for its beauty or ornamental effect upon itself alone, rather than upon other trees.

Of course it is well understood that upon grounds of large extent, or for avenue and roadside planting, trees are often set in rows, groups or pairs. In such cases they depend upon each other to some extent for their best effect; and yet just here great disappointment may come in. It is almost impossible to make trees grow alike as time goes on, how carefully soever they may have been selected and planted. One grows more rapidly than another; one may meet with an accident which will disfigure it; another, perhaps out of an avenue upon the symmetry of which we have put great hopes, may die. In large grounds, in public parks, along the public highway, these disappointments and accidents may be remedied even if at considerable cost. Upon grounds of limited size it is far better to plant so that each tree will depend upon itself for the pleasing effect which it gives, standing in harmony or in contrast with its neighbor, without particular regard to their own size, habit or characteristics.

Grouping or massing trees upon the lawn or about the grounds should be carefully studied. Upon the north and northeast sides of the house, or situation of grounds, trees may be grouped for purposes of protection or shelter from severe winds; but at southeast and southwest there should in general be no massing. If thought best to employ it at these points, the grouping should never interrupt a fine view in the landscape, or be placed near the dwelling. There is no hygienic agency equal to that of the sun—the true source of life. Without it, plants, and animals alike, have but a sickly life or a slow death. No trees, therefore, or anything else, ought to be allowed to keep its healthful beams from striking upon our houses, and coming for a while at least, each day, into all our rooms. Blinds, curtains, draperies, carpets ought to make way for the sun and give it heartiest welcome. Health leaves the house when the sunshine is kept out of it. If one wants the *shade* of trees, let it be sought at some little distance from the dwelling.

Over-planting is liable to be a very general fault with those who set trees about the small home grounds. He who is making a new place, especially, is anxious for rapid size and immediate effect, and it is not infrequently the case that from four to ten times as many trees are planted as the grounds can possibly give space to, and thus beautiful effect and healthfulness of trees are sacrificed. The pretty little maple which you may carry easily in your hand, the slim elm from the corner of the pasture woods, or the small evergreen, may

look lonesome if given all the tree room when planted which they will require after ten or a dozen years of healthy growth. Thus in a little time they become crowded and then not only is their charm and beauty as trees lost, but the highest beauty of the lawn is lost also; for nothing will make amends for the want of some space of clear, unobstructed, beautiful turf, on which the sun may throw its light, and across which may play the shadows of the clouds. The only remedy for thick planting is the axe. But how we dislike to cut them down. They have cost us labor and care and love. We planted some of them, it may chance, for a dear boy or girl, and we have loved them for their sakes. If cut out they mar the beauty of the grounds, if left they become eye-sores. It takes much faith to realize that a little maple will some day require four or five square rods of ground for its own use, or that a fir will not look becoming unless its lower branches have a space of ground thirty feet square on which to spread themselves—but some such faith as this must be exercised whenever one plants trees for the embellishment of his grounds.

Fruit trees are as much out of place on a lawn, or in purely ornamental grounds, as a handful of chips would be thrown upon a pansy bed. The apple tree in the full wealth of its rich fruitage is a beautiful object but its beauty belongs to the orchard not to the lawn. If an exception is to be made in favor of grounds of small extent, let the apple tree be set where it can be picked only. The dropping fruit is not a lawn ornament, its branches are only beautiful when covered with bloom, and then only for a few days. It should never be planted as an ornamental tree.

Again, harmony of form and color in trees, with their artificial surroundings should be regarded. Tall, slender trees will not look well beside a low building with a flat roof, nor will broad, round-topped trees beside a tall building with a sharp roof. It is the rule of personal vesture applied to the forms of arboreal beauty. Tall and short men should dress differently. The hat that would set becomingly upon the one, would look unbecoming upon the other. Color should be studied—not only the spring and summer tints of virgin and mature leaf, but the ripened and brilliant hues of autumn. Crimson and green foliage may go well together with the walls of a white house; while bronze and yellow would have a discordant effect. The effect of color in tree foliage at different seasons, in connection

with its surroundings is a magnificent, broad study, full of inspiration and satisfaction.

In the whole range of literature pertaining to this subject to which I have had access, I have not found a better or more complete code of laws for the proper disposition of trees and shrubs upon the lawn and about the dwelling, than is contained in Mr. Frank Scott's noble work on "The Art of Beautifying Suburban Home Grounds." They are brief, but embrace a whole treatise in themselves, and had I simply read them instead of this long essay, it would seemed to have been complete. They are:

"1. Preserve in one or more places—according to the size and form of the lot—the greatest length of unbroken lawn that the space will admit of.

2. Plant between radiating lines from the house to the outside of the lot, so as to leave open lines of view from the principal windows and entrance porches; also find when, without injuring the views to and from the house, the best vistas may be left from the street into the lot, and from one point to another across the grounds, or to points of interest beyond.

3. Plant the larger trees and shrubs farthest from the centre of the lawn, so that the smaller may be seen to advantage in front of them.

4. On small lots plant no trees which quickly attain great size, if it is intended to have a variety of shrubs and flowers.

5. In adding to belts or groups of trees or shrubs, plant near the saliant points, rather than in bays or openings.

6. Shrubs which rest upon the lawn should not be planted nearer than from six to ten feet from the front fence, except where intended to form a continuous screen or foliage."

The question has been often asked, as it has in reference to other similar subjects, does all this embellishment pay? Is there any money value to the ornamental? The best reply to this which I have at command is contained in a statement made by Mr. John H. Yeaton of Augusta, at a meeting of Kennebec Pomona Grange last fall, at which this matter was under discussion. He gave an account of a small place of six acres in extent located near Augusta which, not so very large a number of years ago, was sold for $800. The purchaser began to fix up and embellish the grounds by planting shade trees, shrubbery, flowers and fruits,including some plums, pears and a few hardy grape vines. In a few years he had so beautified the

surroundings of that place that he sold it for $3,000. It was a large profit to be sure, but the man had the money, his wife took a fancy to the shrubs, flowers and ivy-covered verandah and so he bought it. A few years later somebody else saw that beautiful little place and wanted it. There was no more than the original six acres of land, the buildings had not been enlarged, only kept in good repair, but how attractive the grounds were; what a wealth of beauty there was in trees and vines, flowers and fruit! No, he didn't care about selling, but he would. The other man and his wife also took another fancy to the beautiful surroundings; not to the farm for it was small; not to the house for it was ordinary; but the trees and shrubs and fruit! It would take years to have them in any new place, and there they were, beautiful and luscious, and growing more and more attractive every year. Four thousand dollars. High do you say? But they bought the place.

Ah, my friends, what inanimate object appeals more certainly to the universal heart of man, than a beautiful tree? Its very commonness may be a reason why very many, and especially those who have grown up in well-wooded districts, are not distinctly conscious of the pleasure which they find in trees. It is like their unconsciousness of the delight in the daily enjoyment of the atmosphere. But who, least emotional of mortals though he may be, has not, at some time, if indeed he has not often, felt a tree to be a precious thing. The tired wayfarer, reclining by the dusty roadside under its cool, refreshing shade. What more truly humane picture than that? A party of old and young of both sexes, picnicing on a summer's day, beneath the spreading boughs of some grand old oak! How could such a happy scene be complete without that tree? Yonder lofty and majestic elm, the growth of a century, standing by the side of some farm-house, which though ample in size, it dwarfs to a cottage as it rises above it with its dome of shade, and tosses its giant arms high over roof-tree and chimney top! What an object to fill one at the same time with wonder and admiration! How it starts deep and meditative thoughts even in the most careless beholder. The lordly pine or hemlock, refusing to be robbed of its beauty at any season of the year, but sighing like a hundred Æolian harps, with every breeze, and holding itself before us as an emblem of life and immortality, to cheer us when all around is wrapped in the chill white robe of winter—what object on earth, next after the immortal man himself, is more beautiful or more noble? Man can-

not replace in a lifetime what his axe may destroy in an hour. It has taken a lifetime and more of the past to build up that miracle of beauty, a tree—let us each and all strive to preserve and perpetuate for the admiration of future generations, more than one of these magnificent miracles of beauty.

Following Mr. Boardman's paper an essay was read by Mr. D. H. Knowlton, of Farmington.

ARBOR DAY AND ITS OBSERVANCE.

By D. H. KNOWLTON.

For many years there has been much said in this and foreign countries about the preservation of the forests. The cause for it is well known to all who have thought of the depletion of the forests by the woodman's axe and the devouring flames. Maine bears upon her beautiful seal a noble pine tree, and at home and abroad she has been honored as the "Pine Tree State." When it received this name its hills and valleys were covered with an unbroken forest, save where the settler's axe had cleared his pioneer home. Far and near towering majestically above other forest trees, the tops of the White Pine swayed gracefully in the passing breeze. Where are they now, we may well ask. The lumbermen have felled them, and either at home or abroad the Maine Pine has been worked into thousands of homes. It is a valuable lumber for it is clear, easy to work, and contains those qualities that will preserve it for years when exposed to the elements. To-day, Maine has to send to the South and West for pine, while its high price has necessitated the use of other woods.

I have little confidence in many of the statistics emanating from our various forestry authorities, for some of them are inaccurate and grossly misleading. A paper was recently read by an official of the Forestry Department, dealing with the acreage of forest lands, and the yearly consumption of forest products. Divide the acreage given by the yearly consumption and the result shows that in just nine years and eight months the entire forests of the United States would be consumed. But that portion of the statistics referring to the acreage I have no doubt is reasonably accurate, and from this we learn that of the entire area of the State only 37 3 per cent has been cleared of forests. This was done for the purpose of making

farms, and for one I would be willing to sacrifice as much more for the same purpose. We could afford to give up the forests for an object that would more than double our wealth and population. For agricultural purposes we need not fear the depletion of our forests.

The forests are composed of a great variety of trees, some of which possess little value save for fuel, while the arts and sciences are utilizing others for various commercial products. Fifty years ago our spruce was considered of little value, but while we are gathered here our forests are full of lumbermen, and when the icy bands of winter loosen their grasp upon the streams, there will be millions of spruce logs floating down to the mills, where they will be converted into lumber. In fact, spruce has become the most valuable lumber in the erection of modern buildings. Millions of feet are shipped every year over our railroads and by water to other States and countries. Nor, is this all, for at several points along our rivers are huge mills grinding our spruces and other woods into pulp, which other mills more or less remote are converting into paper. It may not be generally known to you that nearly every newspaper in the United States is printed on paper made entirely or largely from wood. You may think this applies only to the cheap qualities of paper used by our newspaper publishers; but this wood pulp under the skillful manipulation of the chemist enters very largely into the tissues of many other papers. The paper on which a very handsome pamphlet was recently printed in Maine, was made entirely of wood pulp, and its beauty of finish has been favorably noted by many who have examined it. The paper on which these notes of mine are written is called "chemical" paper, but aside from coloring matter it comes from the Maine forests. It is one of the easiest papers to write on I have ever used. It takes the ink well, does not catch the pen points and when written shows the ink clearly and yet it is nothing but wood.

"Take everything you come to, that is three inches through, ten feet from the ground," said a Bangor lumberman to his foreman. This direction seems to be followed by too many of the Maine lumbermen. If the log is too small to cut up it may be ground into pulp.

The Maine hard woods now have a value beyond the supply of fuel. Maple and yellow birch are in demand for floor boards and other purposes, and when finished for use sell in our cities from $40.00 to $60.00 per thousand feet. The shovel manufacturers pay

well for the white ash, which is also in demand for fork handles, rake handles and for other purposes. The oaks are converted into stairs, the beech makes good dowels and lasts, while the brown ash and elm are used in numerous ways.

The hemlock is and has been a very valuable forest tree. The lumber manufactured from it is not the best but it makes a good covering board and holds the nail well, while its bark has been a source of great wealth for the rich supplies of tannic acid it contains. The basswood, which thrives in some parts of the State, is one of the most valuable woods for finishing, but lately it has been converted into carriage panels, and last year the Dennisons bought all they could get in my part of the State to manufacture into jewelry boxes.

If ever a tract of land was looked upon with disdain, by a Maine man in years past, it was the white birch lot. It is not the best fuel though burning readily and making a good heat, but the farmers had the idea that the land in which it grew was worthless for tillage. A white-birch country that can be reached by the railroads is not in the market to-day in this State. An immense industry has been developed within a few years, using the wood of the white birch. Most of the establishments are called "Novelty Turning Works," or something of the kind, and if you could go through these works and see the spools, boxes, toy pails, handles, etc., being turned out you would appreciate the aptness of the name. White birch logs delivered at these mills are worth from $3.50 to $4.50 per cord. The industry gives employment to a large number of men and women.

Other woods still are in great demand, and growing out of their use important industries have been built up, but I have not space to mention them in the limits of this paper. To some extent the forests have an influence in tempering extremes of drouth and heat, though much has been said by men interested in forestry upon the subject is not sustained by facts. It is not my purpose, however, to discuss this but rather to impress upon you the importance of preserving our forests for the great industrial wealth they are contributing to our thrifty people.

THE PRESERVATION OF THE FORESTS.

We come now to the preservation of our forests. It is my object to point out only such means of preservation as are within the reach of those owning large or small tracts of woodland. It is so clearly

for the interests of those owning large timber areas to guard against fires and cutting down half-grown trees, that as a matter of dollars and cents we may reasonably expect them to protect their own interests.

Of the forest area in Maine it is estimated that 22 4 per cent is located upon and forms a part of the farms in the State, and it is to the owners of these farms that the following suggestions may apply.

CUTTING OUT THE OLD TREES.

There are many wood-lots containing an old growth, that has reached its maturity. The natural process of decay has begun ; the trunks are hollow and the winds have gradually shattered their tops. To some extent the farmers have made it a rule to cut out the old trees first, but there are many who in a lazy, shiftless manner either cut when it is easiest for them or else do not cut half enough. Remove the old trees for fuel or lumber. In most parts of the State this will be worth more than enough to pay for the marketing, while their removal gives the younger trees a better chance. The sunshine comes in without obstruction, and the forests having yielded of their full grown trees a profitable crop of wood and timber, are now at work producing another crop for the benefit of their thrifty owners, and in a few years the same process may be repeated and the woodland will be all the more valuable for it.

CUTTING OUT AND PRUNING YOUNG TREES.

The young forests are not receiving the attention they are entitled to. It is so easy for us to let Nature have her way undisturbed, that when the returns are so remote as in forestry, we have not interfered with the natural course of events. When the old growth is cut away Nature quickly begins the restoration of her forests. Thousands of tender leaves shoot up from seeds mysteriously sown by the wild winds, and if protected from grazing animals, in a few years they become an impenetrable jungle. If the stock is allowed to feed here when the leaves are tender, our young forest is likely to be completely annihilated by them or so dwarfed as to be nearly worthless. Again, if the trees are allowed to grow without interference they become so dense, that aside from growing tall they grow very slowly. Go through them with a bush scythe, leaving alternate spaces covered with the young trees, and you will be surprised at the results. The sunshine comes in, warms up the soil, and a rapid

growth follows. A year or two later, if the inferior trees are cut out, it will greatly enhance the value of what remain.

If this cutting out of inferior trees could be practiced in all our woodlands the advantage gained would pay the cost and more to, in the increased value it would give the forests.

TREE PLANTING.

We have special reason for gratitude that there are no large treeless areas in our State, that make in necessary for us to plant trees for fuel, timber or protection. There are, however, thousands of acres of land scattered over our State from which the trees have been cleared, that are quite worthless for tillage or pasturage. The idea of planting these barren hillsides with trees has hardly seemed a practical thing in the past, for the profit is too far away to stimulate much labor in this direction. But let us see. A wise and prudent farmer neglects no part of his farm. His purpose all the while is to employ such a system of culture as will improve his lands and his buildings as well as his stock. Apply the same doctrine to the woodland, and the farmer will be careful to have each acre on his farm producing to its utmost. Now there are parcels of land upon which some of our forest trees will grow, that are not producing enough to pay the taxes on them. Why not sow these with tree seeds, protect from the stock for a year or two, and make them productive? An intelligent farmer tells the writer he knows from his own experience that white birch will be large enough to cut from in fifteen to twenty years. There is a hillside, which at one time was of no account for tillage or grass, and he allowed it to grow up to white birch, the seeds of which were wafted from the neigboring woods. The fifteenth year the trees were from six to eight inches in diameter. Three miles away the wood is worth three dollars and a half to four dollars and a half per cord in the log. This piece of land to-day is a valuable piece of property, because of the white birch growing upon it. The same is true of poplar which is in large demand along the line of our railroads. If anything the poplar will grow more rapidly than the white birch. Other forest trees might be planted in places more remote from the markets, and there can be no doubt that if the unprofitable land was covered with growing trees there would be a constant appreciation in value of the wooded portions of the farm. Look well after the woodlands, and instead of sending all your hard earned dollars to western investors, expend

some of it at least in the improvement of your woodlands. The investment will be safer than any Kansas farm mortgage, because it will continually enhance the value of your farms.

ARBOR DAY.

The ornamentation of private grounds, public parks, and highways is gaining favor in all parts of the country. There are many localities that to a large degree are enjoying from artificial planting all the benefits imparted by the forests. The extremes of heat and cold, moisture and dryness are all modified by the silent influence of the beautiful shade trees that adorn our homes and streets.

The idea of an Arbor Day in America had its origin in Nebraska. The intent was to plant not only shade trees but trees for forests as well. The Nebraska State Board of Agriculture realizing the need of persistent effort to develop in the State a forest area that would protect its population from all the calamities incident to large treeless areas, passed a resolution in January, 1874, that the second Wednesday of April of each year be dedicated to the work of planting trees. The report goes on to say that the resolution was well received by the population of the State, and during that year more than 12,000,000 trees were planted, and that there are now no less than 100,000 acres of planted forests in the State.

Other Western States followed the example of Nebraska, and later in the same year the State Horticultural Society of the State of Iowa adopted an Arbor Day. In 1876, the Governor of Michigan proclaimed an Arbor Day. In Minnesota the State Forestry Association proclaimed Arbor Day, and the same year it is said a million and a half trees were planted. The Legislature of Ohio established Arbor Day in 1882. The State of West Virginia under the lead of its efficient State Superintendent of Public Schools largely observed the day in 1883. In these States the legislatures approved the adoption of Arbor Day shortly after its first observance. New Jersey and other States through their respective legislatures adopted Arbor Day, and when not otherwise designated the Governor by proclamation fixed upon the day. Here in Maine our last legislature adopted Arbor Day. It was quietly observed by several schools, some other bodies and here and there by private individuals.

The scope of the day has recently been widened, and the interest in it very much increased by engaging the pupils of the public schools in its observance. The chief of the Forestry Division of the Agri-

cultural Department remarks very properly, "The way has thus been opened for getting the facts relating to tree growth and the practical uses of trees before the minds of old and young alike, and for creating and diffusing through the community a sentiment which promises much good to the cause of forestry. It is this educational aspect which makes Arbor Day a specially desirable means of forestry reform."

OUR RELATIONS TOWARD THE DAY.

Nothing is more appropriate than that the Maine State Pomological Society should be among the foremost advocates of tree planting, both for ornament and utility. Our name does not imply anything beyond the growing of fruits, but it has always been our custom to consider the culture of flowers, shrubs and trees as forming part of our legitimate field of work. Having this in view I have taken the liberty to address you upon this subject.

Having considered the objects of Arbor Day, I will now offer some suggestions as to its appropriate observance in the State.

THE BOARD OF AGRICULTURE SHOULD LEAD OFF.

You have already noted that it was a Board of Agriculture that first instituted a general observance of Arbor Day. This suggests that inasmuch as our Board of Agriculture is the organized representative of our agricultural industries, it should lead off in the appropriate observance of Arbor Day in the State. The various State institutions, so far as I have visited them are quite generally surrounded by thrifty shade trees, and many of the grounds are beautifully laid out. But there are other places that need decoration, and it would be a pleasure to have the Board unite with some local body of less importance each year and make Arbor Day a grand and important event for agriculture in that neighborhood. Of course in connection with the observance of Arbor Day tree planting, tree culture, and forestry should be made most prominent in the programme, but as supplementary to these, the presence of a large number may be taken advantage of, and some of the best institute work of the entire season might be sandwiched in with the other exercises. The day comes when the farmers are very busy, you say; so does the Fourth of July and circus, when even those who have compunctions about entering the canvas, harness up and come out to show the children the street parade. Timely topics could be

selected for discussions and papers, and in my opinion the Board could not find a better opportunity for useful work.

OUR AGRICULTURAL GROUNDS NEED DECORATING.

But we can hardly expect the Board of Agriculture to engage in this work unless the opportunity is offered them. There are a large number of fair grounds in Maine. Their high board fences mar the beauty of the landscape, and on exhibition days as one approaches the entrance, a policeman peeps up from the inside to see that no ragamuffin is preparing to scale the walls. They remind us very much of the unsightly walls by which *some* of our State institutions are surrounded. Is there any place where the observance of Arbor Day would accomplish more? Years ago in the earlier days of our agricultural societies it was the custom for the people to gather in some public place during the annual exhibition and listen to an oration and poem prepared for the occasion. But for some reason this custom has given place to the horse trot and other exercises within the fair grounds, and now the societies have no public exercises during the entire year, in which there is any effort to disseminate by addresses, papers and discussions a knowledge of the art of agriculture. No effort has been made so far as I know to ornament the grounds very much, while some of the buildings are just horrid to behold. The excellent president of the State Agricultural Society some years since loaded his hay-rack with trees and drove to the fair grounds in Lewiston. These he planted about the park, and they already add much to the attractions there. As the years roll by they will send their roots down deep into the soil, and their outspreading branches will offer grateful umbrage to man and beast long years after the revered planter shall have passed away. There is room for more, and it would be highly gratifying if our State Agricultural Society would lead the way in this as they are doing in many other matters of less importance.

Let our local societies observe Arbor Day by planting trees and ornamenting their parks. Don't plant all the trees this year, for there will be none to plant next, but let some one of good taste in such matters lay out and sketch an outline of the exhibition grounds and indicate where the trees may be set to the best advantage. If it may be determined what varieties to plant as well, it will serve for the guidance of the society. Plant a few in parts most needed and so on each year, and when the design shall be carried out in all its

details, the work will not all be done for there will then be many chances for improving the grounds.

Now, why not make a *day* of this tree planting? Arrange for a good time without a horse trot and its bad associations. Begin early to make up a programme, giving the forenoon to the exercises connected with tree planting, which may be interspersed with addresses and papers prepared for the occasion, music, etc. At noon throw open the exhibition halls, and have a grand basket picnic. In the afternoon, and evening too, if you wish, call to your aid the Board of Agriculture for some speaking, but by all means use all the local talent possible. As much more may be added as the means of the society will permit.

THE SCHOOLS AND ARBOR DAY.

It has long been said to our disgrace that our school houses are located in barren, unattractive places, and that we are doing little to improve them. In the West, the schools were among the first to observe the day. Everywhere outside of the State, Maine teachers are among the foremost in the land. I believe the teachers remaining in the State are among the best as well. What a grand opportunity there is to do lasting work for the improvement of our desolate school grounds. The beautiful campus of one of our Maine colleges is covered with trees planted by the successive classes who have graduated from the institution. Years after the classes have separated, there is no place which offers more cordial greeting than the wide spreading branches of these trees. Many a college man returning to his *alma mater* in after years first seeks the grateful umbrage of the tree his hands assisted in planting in the days of yore. Do you suppose children would have less enthusiasm for tree planting? Our experience tells us that they would clap their hands with joy if only the teacher and parents would assist them in the appropriate observance of Arbor Day. Of what, some teacher may ask, shall such observance consist? Well, in the first place select one or more places where you wish to set the trees. Then ask the boys to select the best trees they can find for the purpose. When Arbor Day comes the forenoon may be spent by the boys or the entire school in getting the trees dug up and ready to set out. While the boys are doing this the girls could gather vines for a beautiful wreath with which to adorn the tree. There will perhaps be time to gather round the tree during the forenoon, set it out, sing a song or

two and decorate it with such wreaths and flowers as may be had. Should there be nothing more than this the exercise would be a good one, but there may be added to it readings about trees and flowers, some of the older ones may write something about the care of trees or the teacher may tell the pupils many interesting facts about trees, or there may be some one whom the teacher may call in to assist in making the exercises more interesting. Let this kind of tree planting be done year after year by our schools and our boys and girls would learn to love the old school-houses and grounds, as you and I, Mr. President, never dreamed of in our boyhood. It would not be many years till these "waste places," as some one calls them, would be the most cheerful spots in all the land.

OTHER ORGANIZATIONS SHOULD OBSERVE THE DAY.

The State Grange was one of the first organizations to urge the adoption of Arbor Day by the Legislature. Many of the granges in the State own halls of their own, some of which the enterprising patrons have already surrounded by trees. We have no doubt of their interest in Arbor Day, and their readiness either to observe it themselves or unite with others in doing it.

The churches have grounds, many of which are treeless; the cemeteries also call for our fostering care, and in no way can more enduring tributes be paid to the memory of the dead than by adorning their resting places with trees.

Village improvement societies may find in Arbor Day an opportunity of doing much to perpetuate the memory of their good works for years to come. There may be still another organization of which we will not speak, feeling all the while that a general observance of Arbor Day in Maine would pay its people well for their time and labor.

INDIVIDUAL OBSERVANCE OF THE DAY.

But, before closing I should be guilty of omission if I failed to call your attention to the importance of appropriately observing the day as individuals. I have tried to make it appear the duty and privilege of numerous organizations to observe the day in a public manner, and I now respectfully urge that every man who owns a home should observe Arbor Day year by year, till our homes are surrounded by trees and shrubs for ornament, shade and profit. When our excellent chief magistrate appoints the day let us be ready

to observe it. "What shall we plant?" you ask. We would plant, as a rule, only the thrifty, hardy growing trees and shrubs that may be had in abundance on any of our farms. There are other varieties, perhaps, that would do well, but life is too short for us to experiment very much, when we are in haste to enjoy the luxury of pleasantly surrounded homes.

Permit me to say that to my eyes there is no tree upon the lawn or on the roadside possessed of more real beauty than the apple tree. For one it will give me pleasure to plant the apple tree, thinking, perchance, my little ones in after years will fondly thank me for its grateful shade, its sweet scented blossoms, and its delicious fruits. Then would I join with the venerable poet who sweetly sings of "The Planting of the Apple Tree."

What plant we in this apple tree?
Buds, which the breath of summer days
Shall lengthen into leafy sprays;
Boughs, where the thrush, with crimson breast,
Shall haunt and sing and hide her nest;
We plant, upon the sunny lea,
A shadow for the noontide hour,
A shelter from the summer shower,
When we plant the apple tree.

What plant we in this apple tree?
Sweets, for a hundred flowery springs
To load the May-winds restless wings,
When, from the orchard row, he pours
Its fragrance through our open doors;
A world of blossoms for the bee,
Flowers for the sick girl's silent room,
For the glad infant sprigs of bloom,
We plant with the apple tree.

What plant we in this apple tree?
Fruits, that shall swell in sunny June,
And redden in the August noon,
And drop, when gentle airs come by,
That fan the blue September sky;
While children come, with cries of glee,
And seek them where the fragrant grass
Betrays their bed to those who pass
At the foot of the apple tree.

And when, above this apple tree,
The winter stars are quivering bright,
And winds go howling through the night,
Girls, whose young eyes o'erflow with mirth,
Shall peel its fruit by cottage hearth,
And guests in prouder homes shall see,
Heaped with the grapes of Cintra's vine
And golden orange of the line,
The fruit of the apple tree.

The fruitage of this apple tree,
Winds, and our flag of stripe and star,
Shall bear to coasts that lie afar,
Where men shall wonder at the view
And ask in what fair groves they grew;
And sojourners beyond the sea
Shall think of childhood's careless day
And long, long hours of summer play,
In the shade of the apple tree.

DISCUSSION.

Secretary Gilbert of the Board of Agriculture assumed the chair, and the papers were discussed.

Sec. GILBERT. The excellent papers to which you have listened this afternoon have fairly well covered the ground in the subject under consideration; yet, there is always room to clinch a good argument, and I presume that individuals here present would like to discuss some of the suggestive points which have been presented by the speakers of the afternoon on either subject, as the two are so closely allied that they may be discussed in conjunction quite as well as distinctly. The matter of planting trees for ornament and shade is always a fruitful one. The subject of Arbor Day is new to us here in our State, comparatively. Any further remarks as to the ways and methods of observing it, of enforcing the idea of its observance on the minds of our people would be very acceptable at this time and we will wait for voluntary remarks from any one present.

Mr. ATHERTON. There are two points in this last paper that I do not like to have passed by unnoticed. The first is Arbor Day itself. In my judgment it is altogether too late. It was last year, I think, the 10th of May. There is a school-house near by my place, and the teacher wanted to interest the scholars in Arbor Day and wanted them to set out some trees around the school-house, and the teacher

wanted me to assist the scholars in getting some trees and in setting them out. I told her it was a very busy season for me, right in planting time. I presume the writer of this paper is not a farmer and of course he cannot appreciate as farmers would, how exceedingly difficult it is for farmers to leave in the midst of planting to observe Arbor Day, although he may appreciate it to some extent. But I told the teacher I would do what I could, that I would spend half a day at least. When we arrived at the forest I was surprised to find that the trees had commenced budding. "Now," said I, "children, we are here, and I wish you to observe that these trees are too forward to be successfully taken up and transplanted; the buds are so far forward I am afraid they will not live, but we are here and we will do the best we can." The boys helped me all they could and we took up four maples and carried them to the schoolyard; I cut them back severely and they were set out, principally by the children themselves; I helped them what I could. Two of the trees lived and two died. I said to the children, "Now if they die we will make an attempt another year and perhaps we will dig the trees up earlier, before Arbor Day, and I will hul them in somewhere, and then we will plant them on Arbor Day, and we will be sure they will live and so we will make the day more successful."

With regard to forestry, I do wish the Legislature of this State would see fit to grant some encouragement. I wish the Governor might recommend, in his message to the Legislature, for them to grant some encouragement to the farmer. I am a farmer, but I do say that the farmers as a rule, are the most careless of people in regard to what is for their own interest. When they cut off the wood they do not take pains to enclose the land, they let the cattle run over it and browse the young plants that spring up and thus destroy what would eventually make a fine growth of trees. On my home farm there was a heavy growth of some fifty cords to the acre, and when we cut it off we left ten acres to see what it would grow up to. There began to spring up a growth of hard wood, some poplars, white birches, and among them some black spruce; and we would turn our cattle out on each side of the wood-lot in the fall, and they would run through the forest, and I found afterwards that nothing was coming up there of any value, and as I didn't care to fence in that forest I concluded I would let the whole go and cut the whole off and make a pasture of the whole, as I had another wood-lot only about a mile from my place, in the town of Man-

chester. Now, on this Manchester lot of twenty-five acres the growth was all cut off some forty-five years ago, and now I am cutting on that same land wood which averages thirty to thirty-five cords to the acre, of maple, beech, poplar; and there are a number of trees of hemlocks of considerable value ranging from a foot to a foot and a half and some two feet in diameter. The poplars are from six inches to fifteen in diameter. I am selling wood every year now from that lot, the best of hard wood bringing me six dollars a cord dry and five green. For the poplar I get four dollars a cord. So I may safely say that that wood brings me in an average of five dollars a cord. At thirty cords per acre that would be one hundred and fifty dollars per acre from that growth of forty years. Now isn't that land worth preserving? And wouldn't many of our farmers be better off if they had taken the pains to enclose the land where they cut off their forest? I know right in the city of Augusta there are forests, on the Bond brook road and on Mt. Vernon Avenue there are forests of fine growth where only forty or fifty years ago the land was stripped, because cattle have not occupied it; and close to Hallowell there is a valuable growth of wood on a piece that in my boyhood days was entirely stripped. The wood lot is now very valuable and is owned by the Winthrop heirs of Boston.

Sec. GILBERT. The matter of the proper time for Arbor Day is one of some importance and I fully appreciate the remarks of the gentleman last up in regard to the situation last year. While we know that the matter of the appointment of that day is in the hands of the Governor, yet I presume he would be glad of suggestions on our part, or from a meeting of this kind, representing a wide area of the State, in regard to what date would be suitable to set apart for that purpose. And I think it would be a very good thing indeed to suggest a day or a week here at this time and communicate the same to the Governor.

Mr. BRIGGS. There was one point advanced, in regard to cutting wood for timber, that I should not entirely agree with the speaker about. I have been in the wood and lumbering business twenty-five or thirty years until some five or six years ago. Formerly, I had my choppers take out the old growth. I soon found out that that was not the best way to protect our wood lots. Latterly, I have cut everything clean when cutting for timber. If you wish it to grow up to any other growth or to reproduce itself, it should

be fenced so that the cattle will not destroy the small growth. I have observed Arbor Day for ten years, one fixed by myself. The first was some ten years ago; I sent two men into the woods to take up some evergreen trees. They took up pine and cedar. As you all know, we live in a cold country, and I thought it would be a nice plan to set evergreen trees north of my buildings. I set those pine and cedar alternately, and they are growing and doing nicely and we are experiencing a great advantage in that direction. It does break the cold winds that blow over the hills and through the valleys; when they strike our buildings they are a good deal mitigated by these trees. I believe it would be advantageous for us fruit growers and orchardists to set different varieties of trees. We cannot observe exactly one day every year. For instance, if we want to set certain varieties of plum, cherry, apple or pear trees, they do not come into the right condition at the same time and we could not do that on a fixed day, unless we do as Mr. Atherton has suggested, take them up beforehand and wait for the day to come.

Mr. MERRILL. As the gentleman has had experience in transplanting evergreens I would like to ask him what month is best for that?

Mr. BRIGGS. I would take up evergreens the last of May usually. I have set some several times, and those that were taken up earlier in the season did not flourish as well as those taken up later.

Mr. MERRILL. We have tried four months, sometimes the latter part of April and May, June and July, to transplant evergreens and I think the most successful time has been the latter part of June or first of July.

On motion of Mr. Knowlton it was voted, That in the opinion of this joint meeting of the State Pomological Society, and the State Board of Agriculture, the date of Arbor Day should not be later than May 1st.

Mr. AUGUR. May I make a single point in regard to what has already been said, on Arbor Day, etc.? I have enjoyed these papers this afternoon exceedingly. It seems to me they are of a very high order. I think you ought to be congratulated upon having papers of such a character. And now, in connection with that, I would like to bring home one or two points and make an appeal to you. Before me I see gentlemen whose locks are whitened by the snows of many winters. At the same time I see some boys that look destined to make good citizens of Maine. Some of the most valuable of the

teachers in our State have been trained in Maine I am happy to say. I am going to assume in behalf of the school-house grounds of Maine, without knowing anything about it, that they may be something in the same condition as those in Connecticut. Almost all our rural school-houses have very small grounds, in some instances, only large enough to contain the school-house and a passage around it. Now wouldn't it be a grand idea, in connection with Arbor Day, if the people of each district would just move off in this matter by a little subscription or contribution to enlarge the grounds to half an acre or an acre to be devoted to thorough ornamentation. Let Arbor Day then be observed with zest and occupy that ground with trees and also have beds prepared for flowers. I believe the boys would like it; I know the girls would, and I think you all would. I believe your schools would be all the better.

Another thing. We occasionally hear a lady say "My grandmother when she was seventy years old helped set out that tree; we call it by her name; it is a memorial tree" or "my grandfather" or "my father," as the case may be. Plant these memorial trees, of course getting something choice, something that you will not be ashamed of, in connection with any of your friends, and then let them stand as memorials. Some of you may have heard of the great Weathersfield elm, which is claimed to be the best elm in the United States. It has a spread of one hundred fifty-two feet, is very symmetrical and very beautiful as well as very large. I will just give a little history of that tree. One of the early settlers went out to his pasture horseback one summer day, and as he passed through the low ground he saw a very thrifty and beautiful little elm, and he was so struck with its beauty that he got off his horse, pulled the tree up by the roots, and took it home horseback. The name of that man, in connection with that tree I think is better commemorated than it would be by marble or granite. It has found its place in history and he will be remembered in connection with it.

EVENING.

The meeting was called to order by the President, who introduced Mr. Lewis Frederick Starrett of Rockland, who read several beautiful poems, translated by him from the German. The following original poem was prepared for this occasion.

INSPIRATION.

By Lewis Frederick Starrett.

When not a sound is heard
  By the dull ear,
Oft an inspiring word
  Doth the soul hear.
'Twas so of old time, and
  'Tis so to-day.
Well, if one understand,
  If he obey.

Earth hath her Edens yet;
  As of old, still
To man the task is set
  To keep and till.
To him the voice saith: "what
  Thou wouldst have, make;
Know that the ground is not
  Cursed for man's sake.

"Nor think that thou wert blessed,
  Did the soil teem,
With bounteous fruits, undressed,
  Should it so seem.
Find in earth's torrid zone
  Crops without care,
And see that man alone
  Is a dwarf there.

"Study with watchful eye,
  Plant, shrub and tree;
God gave them to thee, thy
  Servants to be.
Food from what now is waste
  Let them bestow;
Bid thou the tasteless taste,
  And the small grow.

"No season's slave be thou,
Rather its king.
Make each before thee bow,
And tribute bring;
Fabrics which thou shalt wear,
Fruits thou shalt eat,
Flowers that perfume the air
With fragrance sweet.

"What men on thee bestow
See thou dost earn;
That worth thy while to know
Strive hard to learn;
Be brave to cope with wrong;
Learn to endure;
Keep thou thy body strong,
And thy soul pure.

"That which is lovely, prize
For its own sake,
Then that which round thee lies
Fair thou wilt make.
Steadfast thy purpose hold;
So shall thy field,
More than its hundred fold
Unto thee yield."

Prof. Carl Braun of Bangor, was introduced and read a paper on "Insects Injurious to Fruits," which he illustrated by means of stereopticon views.

INSECTS INJURIOUS TO FRUITS.

By Prof. CARL BRAUN.

When Louis Agassiz came to this country in the year 1846 from Switzerland he was asked shortly after his arrival to lecture before the Society of Natural History in Boston. He was perplexed, knowing that he had not full command of the English language. When he stated this fact to the President of that body the latter gentleman smiled and said, "You can speak to us in any language you like; we will understand you anyway." I use this illustration as an introductory in regard to myself, not that I wish to place myself on the same level with that illustrious man nor to make you believe that I have deeply drank from the wells of wisdom in Natural History, but merely in regard to my nationality which expresses ideas in another language. I, like Louis Agassiz, then have to say, "It is not the thought which perplexes me," but to turn these thoughts into good English is the difficulty under which I labor. Nevertheless the truths of science, and particularly the descriptions of natural objects need no oratory. When the latter is applied to science it loses its value and becomes unintelligible. Therefore, trusting in your forbearance of overlooking all my blunders in speech, I have accepted the invitation of your honorable Secretary to speak to you to-night on the "Insects Injurious to Fruits."

The profit which we derive of all the insects in the world by no means small, sinks into insignificance when we on the other hand consider the depredations and ravages which the greatest number of them cause to vegetation in general. As cultivation of the soil, raising of fruit and plants is keeping step with the spirit of time, it seems that the ravages of obnoxious insects are likewise becoming more and more obvious Therefore the live farmer and fruit raiser of to-day is constantly alarmed and fretted by the sturdy growing insect pests and looks about himself how to check and exterminate these unwelcome intruders. But before he is able to accomplish this task thoroughly, he is forced to study the nature and development of these intruders in order to find the best and quickest means of putting a stop to their ravages, in short, a progressive husbandman ought to be a naturalist in the very sense of the word. He has to deal not only with entomology but with almost every branch of the natural sciences.

The farmer can easily protect himself from the depredations of birds and other animals; it is not so easy for him to do this in regard to the insects, and only the farmer and fruit raiser who has a good knowledge of entomology will be able to accomplish this thoroughly.

Having since my boyhood applied myself to the study of natural history in general and to entomology as a specialty, my advice to you, ladies and gentlemen interested in farming and fruit raising, is, you must be diligent students of the natural sciences if you desire that your labor shall not be in vain and that you may derive the profit which your work justly deserves.

The study of these sciences will lead you to thorough investigations by the means of which you will discover your enemies in every stage of development and you will then soon be able to apply the best and surest remedies to protect yourselves from those depredations, if not entirely yet to a greater extent than without the knowledge of natural history. Your labor will be doubly rewarded; besides it will make you happy, fill your mind with useful and important truths, and you will prosper in the chosen part of your life's occupation. I wish to night I could enthuse every one of you with a love and admiration for the study of nature. You have the best opportunity, living as it were in the midst of nature's works, drawing from nature your resources; you ought at least be grateful enough to pay sufficient attention to nature in studying her laws, which she by innumerable devices invites you to do.

But to my task. In order to give you a thorough insight of the insects I will mention in my discourse, I must classify them. We divide the insects into the following classes.

1. *Lepidoptera*, or scale-winged insects, including the butterflies and moths.

2. *Coleoptera*, or sheath-winged insects, comprising the beetles.

3. *Hymenoptera*, membrane-winged insects; this order includes bees, wasps, and ants.

4. *Diptera*, or two-winged insects, of which the true fly is an example.

5. *Hemiptera*, half-winged insects, or true bugs, tree bugs, and plant bugs.

6. *Orthoptera*, or straight-winged insects, grasshoppers, locusts, and crickets,

7. *Neuroptera*, nerve-winged insects, including dragon-flies, etc.

8. *Aptera*, or wingless insects, aphidæ, lice, flies, etc.

THE DEVELOPMENT.

Insects come from eggs, which the female with parental care deposits on or near the food plant, that her progeny when born or hatched may find their food. Most of the larvæ (that is the insect in its second stage) feed on plants.

INSECTS INJURIOUS TO THE APPLE TREE ATTACKING THE ROOTS OF THE TREE.

The apple root plant-louse (*Schozonewra lanigera*). This insect sucks the juices of the roots causing thereby wart-like swellings in different shapes. They take away a great deal of our nourishment from the tree; when abundant will cause death to young trees.

Remedies. Scalding hot water poured freely on the roots, after being laid bare, will destroy the insect entirely. This insect has several enemies, which help to check its depredations.

ATTACKING THE TRUNK.

The round-headed apple-tree borer (*Saperda candida*). The female deposits her eggs near the base of the trunk, the young larvæ hatch in two weeks and at once make their way through the outer bark, into the wood of the trunk. It makes flat, shallow cavities in which it lives three years before it changes into a pupa. By the long duration of its larva state it causes great injuries to the tree. It may easily be detected by its castings, which fall from the cavities. While it is partial to the apple tree, it also attacks pear, cherry and shade trees.

Remedies. Scrape the bark, where the castings are, in August and September and you will find the larva; wash the place with alkali or a solution of potash. It has been proved that the female of this beetle will not lay her eggs on trees, treated in this way.

The flat-headed apple tree borer. This enemy may easily be detected by the discoloration of the bark. This beetle is common everywhere, east, south and west. It is a very active creature; it likes to bask in the hot sunshine, and when disturbed takes wings. The female lays her eggs under the bark in the crevices. The larva after hatching bores into the sap-wood, where it scoops flat channels and when full grown changes to a beetle.

Remedy. Cut the beetle's larva out and wash the wound with strong soft soap and solution of soda.

The Stag beetle, (*Lucanus dama*), a large and powerful beetle, a very common insect. The eggs are laid in the crevices of old apple trees. The larva takes six years in completing its growth, it is therefore very injurious. It is easily found by its castings; cut in and destroy it, wash the bark with alkaline solution.

(*Alaus oculatus*), the Eyed Elator, attacking the trunk of old trees. It is the largest of the jumping beetles; when laid on its back, it will spring up and right itself again. The larva matures in one season.

Remedy. The same as the former.

The apple Liopus (*Liopus facetus*). Attacking the branches. A small long-horned beetle. It bores into the decayed branches of the apple tree; it is easily detected by its castings.

Remedy. Cut the larva out, wash the wound with slaked lime.

The apple tree pruner. (*Elaphidion villosum.*) The habits of this beetle are peculiar. The female lays an egg in the axil of a leaf on a fresh green twig in the beginning of June. The young larva bores into the centre of the twig consuming in its course the soft pulpy matter. When approaching maturity it feeds upon the harder wood, cutting the twig almost through so that a strong wind will sever it from the tree This action it performs with great skill. The fall winds will break the twigs and the larva stays over winter in the fallen limb, till next spring, when the new beetle cuts its way out of the wood.

Remedy. Gather all the fallen branches, as a rule, every spring and burn them up.

The apple tree tent-caterpillar (*Clisiocampa Americana*). A native of the United States. This, as every one knows, is a great pest to the fruit-raiser. The female lays her eggs in the latter part of July around the smaller twigs of fruit trees, apple and cherry, in clusters and rows of twenty and coats them with a gummy covering, they stay in this way the whole winter on the tree and in the early spring when the first leaf breaks forth, the young larvæ hatch and commence to spin a web enlarging it as they grow. They come to maturity in six weeks and have then, if not checked, almost stripped young trees of foliage.

Remedies. The best means of destroying them is to cut the twig with the eggs from the tree in the winter months; the tree having no leaves, the clusters are easily detected; be sure that you look at every tree, one cannot be too careful. If there should be some egg

cluster overlooked, the young web in the latter part of May will remind you of your friends; then take it down with a long pole, round the upper end of which you have to tie a rag; twist the pole into the nest, and the whole structure in company with the inmates will adhere to it. This should be done early in the morning or after sundown, when the inhabitants of the tent can always be found at home. Now burn them up; this is the only safe remedy. Government should collect a fine from those who neglect to destroy this merciless enemy to the apple tree and other fruit trees.

The Forest Tent Caterpillar (*Clisiocampa sylvatica*). This insect resembles the foregoing very closely in all its stages. The eggs on the twig are cut off squarely on each end, while the others are rounded off. It makes no tent but congregates in masses during the time of moulting on the branches of the tree, where it can easily be detected and destroyed; while it is partial to all the varieties of apples it is also found on the cultivated and wild cherry; the egg clusters ought to be destroyed during the early spring months before hatching.

The Tussock-Moth (*Orgyia leucostigma*). The female of this insect is wingless, she lays her eggs on the top of the cocoon, rolls them up in a leaf and fastens them to a branch of the tree. One cannot help noticing these dead leaves during the winter months.

There are 300 to 400 small cylindrical eggs pasted to the cocoon; they are covered over with a chalky matter; they hatch about the middle of May, when they at once commence their depredations. They are very common and do a great deal of harm.

Remedy. Gather the leaves during winter and burn them.

The Red-humped Apple-tree Caterpillar (*Œdemasia concinna*). The female deposits the eggs in clusters on the under side of the leaf during the month of July. The young larvæ only eat the pulp, leaving the ribs of the leaf; here they may soon be discovered.

Remedy. Pick the leaves and destroy the pest.

The Canker Worms (*Anisopteryx vernata*) and (*Ansopt. pometaria.*) The females of both species are wingless. The larva transforms in the ground. The eggs are laid in clusters on the branches of the tree in the latter part of September. The eggs hatch the next spring, the insect appears in the first days of September. They are some seasons very numerous and injurious

Remedies. Various measures have been employed to destroy the females, or keep them from climbing the trees to lay their eggs.

This insect is a difficult enemy to deal with. I have often found the eggs on fences near the trees and have observed the young larvæ crawling to the ground and hunting for their food. It seems that tar, oil traps and other means, preventing the female from climbing the tree are quite useless, and comparatively without success; when the female cannot succeed in laying her eggs on the trunk of the tree, she will deposit them in most any place, and the young caterpillars will find their food. I believe when spraying for the destruction of the codling moth, a great many of the young caterpillars of this moth and other different insects, living on the foliage of the tree, will be destroyed by the poison contained in the liquid. This liquid should be a solution of Paris Green, two teaspoonsful to a gallon of water; this will kill the canker worm, the codling moth, and everything that is feeding on the tree at the same time. This has been tried and found the best method of destroying larvæ feeding on the apple tree.

The Fall Web-worm (*Hyphantria textor.*) After clearing the trees from the large tent caterpillars in the spring, the fruit-grower often is obliged to make another raid at the fall web-worm, which frequently infests his trees in September. The web is easily detected, and should, as soon as noticed, be removed. The moth is a small white insect. It hibernates in the pupa state in a slight cocoon and comes forth the next June or July. The fruit raiser by removing the web early and destroying its contents can easily get rid of them.

The Apple-leaf's Sewer (*Phoxopteris nubeculana*). It spans one inch across the wings, it belongs to the leaf-rollers (*Tortricidæ*). The eggs are laid in June. The larva is found throughout the summer on apple leaves, in which, when full grown, it rolls up and passes the winter therein, making the edges meet which then forms a case. The inside it lines with silk. By approach of winter the leaf falls to the ground with the larva; here covered up by the snow it spends the winter warm and snug. Some seasons it is very abundant and will then seriously injure the foliage. The dried leaves in the spring should be collected and burned. This should never be forgotten; a great many other insects in various stages hide among the leaves, and burning all the dry leaves in spring before these insects come to life again, should be strictly attended to.

The White Eugonia (*Eugonia subsignaria*). This is a small, white moth $1\frac{1}{2}$ inch expanse. While it is partial to the elm and shade trees it has of late often been found on the leaves of the apple tree. The eggs

are laid on the small twigs in patches of a hundred and more. It enters the ground when full grown and the moth appears the next June. Where abundant on apple trees it may be destroyed by spraying with Paris Green.

The Apple-tree Case-Bearers. (*Coleophora malivorella.*) In the early spring there may often be seen on the twigs of the apple tree little pistol shaped cases, each of them containing a small larva, which has the power of moving from one place to the other with this case. They are principally feeding when young on the buds, later they devour the leaves. They can be destroyed by hand picking.

The Apple-leaf Bucculatrix (*Bucculatrix pomifoliella.*) The larva of this small moth feeds on the outside of the leaf. This larva when disturbed lets itself down by a thread of silk to the ground. The insect is double brooded. The caterpillar attaches its cocoon to the branches and here it hatches. The second brood hibernates in the cocoon attached to the limb. Some seasons this insect appears in great numbers and then becomes very injurious to the foliage.

Remedy. The cocoons on the trees can be brushed with a solution of alkali; this fluid will penetrate the cocoons and destroy the inmates, or scrape the cocoons from the tree and burn them.

The Codling Moth. (*Carpocapsa pomonella.*) This little moth, as every fruit grower is well aware of, is the most difficult enemy to deal with. It is of foreign origin. It came to us from Europe about the beginning of the present century. It is found in almost all parts of North America and Canada, where it destroys a great many apples yearly and so causing a considerable loss to the apple grower. There are two broods of them. The first moth appears as soon as the blossoms open. The female lays a very small globular egg invariably in the eye of the apple just forming. In about a week the young larva hatches and burrows into the pulp to the core. It feeds then close to the core and in three weeks is full grown, it now leaves the apple and hides under the bark of branch or trunk where it spins a cocoon of silk. The larva is yellowish or pinkish, about one-half inch long with a horny brown head. The pupa is about three-eighths of an inch long of light brown color and hatches in ten days. This is the first brood of apple destroyers. Now the females after having paired, lay another batch of eggs in the later varieties of apples. Each moth lays about fifty eggs sometimes more. If left to their own way these intruders will soon spoil

the whole crop in an apple orchard. The moth is a beautiful little creature; it spans about three-fourths of an inch, is of brown glossy color; sometimes light-colored specimens are found. It hibernates in the larva state inside the little cocoon, or in the apple of which a great many, with approach of winter are stowed away in barrels.

Remedy. The most effective method of destroying this persistent and very injurious little intruder is spraying with a sulution of Paris Green, as repeatedly has been proved. Two teaspoonfuls of poison to a gallon of water, well mixed, applied with a good syringe to the foliage. These syringes are now made for this purpose. The time of spraying for the early varieties is the first week in June, for the later fruits in July. The process should be repeated after a few days to make sure your work, especially when rain after spraying has washed the poison from the foliage to any extent. But be it remembered the trees should never be sprayed with Paris Green solution after the apple has turned downward on its stem; this operation would be dangerous if the fruit is to be used later.

Besides, traps as recommended by many could be used to some advantage. They ought to be visited every week, twice, and the cocoons and larvæ found in them destroyed. All the fallen fruit should be carefully gathered and fed to hogs, or done away with, where the larvæ yet in the apple may perish. When collecting at night, with a lantern, insects, especially Noctuidæ with molasses I have often observed the females laying their eggs. Nothing will disturb them from their duty. One can almost put the light close on to them; they will not stir. I have sometimes picked them off with my fingers, but in all my collecting which is a good many years, I have never caught a codling moth coming to my light, nor ever one at sugar smirred on the trees under their very noses. Whoever has invented the story that codling moths will take sugar must have mistaken the numerous other smaller Noctuidæ which he may have caught. It is folly to think of putting bottles with sweet stuff among the branches of trees; at least my experience of twenty years has proved it to me to be so. I would further recommend the burning of sulphur in little saucers here and there, one under the trees at night in beginning of June. This process has been tried in Germany of late, with great effect.

The Apple Maggot (*Trypeta pomonella*). This insect as I am informed by your Honorable Secretary, Mr. Boardman, has done here, in the western part of the State, a great deal of injury to the apples.

It has also been reported from Massachusetts, Connecticut and New York. The fly appears in July; with a sharp ovipositor it inserts its eggs into the apple. It frequently attacks apples which have been previously perforated by the codling moth. It is said to prefer thin skinned summer fruit to the winter varieties. There is only one brood of this insect; it enters the ground for transformation. If this enemy should become troublesome to the fruit-raiser it would be a dangerous one to deal with; but it seems that being a fly the whole tribe is not very abundant every season. As I have not yet observed this pest, I do not know what remedy.

The Twig Girdler (*Oncideres cingulatus*). The young larva burrows into the wood and feeds on it; here it transforms to a pupa. The twig having been girdled by the female will easily break off with the fall winds. The pupa winters in the fallen limb on the ground; the beetle appears the next season. All the fallen branches should be collected in the early spring and destroyed by fire. There are a good many other species hidden away in fallen branches and the orchardist should be very careful in collecting them every spring and burning them up as a rule.

The Pear-tree Slug (*Selandria cerasi*). This is a saw-fly, having a small ovipositor in a shape of a saw. With this instrument the female cuts slits in the leaves and inserts an egg in every slit. The slugs are covered with a bluish slime, which is disgusting to behold; it has a strong repugnant smell, they eat holes in the leaves. When full grown it appears in a clean dress, descends to the ground and transforms and hatches in about three weeks. In the middle of July the new females deposit a new batch of eggs.

Remedy. Hellebore, in powder, mixed with water, in proportion of one ounce to two gallons of water, applied to the foliage with a syringe, will kill the slug. On small trees air-slacked lime dusted on the foliage will be of good effect.

The Plum Curculio (*Conotrachelus nenuphar*). The larva burrows into the flesh and feeds around the stone; when full grown, in three to four weeks, the larva enters the ground and transforms. It remains over winter in the beetle state, and comes forth again next spring.

Remedy. The beetle can be easily destroyed by shaking the tree and spreading a cloth under it; they will fall, and may then be destroyed. The tree should be jarred when in blossom, and to be continued daily, mornings and evenings till they become scarce. It is very

important that the fallen fruit be gathered and burned, that the larvæ contained therein may be destroyed. Also here the practice of burning sulphur is a good remedy to drive the beetle away.

The Imported Currant-worm (*Nematus ventricosus*). This insect is a saw fly; it comes from Europe, first noticed in America in 1858; according to Mr. Harris, it has within this comparatively short space of time swept over almost all the Union and Canada. It is a very injurious as well as persistent enemy. Very early in Spring the fly appears. The female lays her eggs on the under side of the leaf on the center veins in rows. In ten days they hatch. At first they eat small holes in the leaves, but as they approach maturity they eat the whole leaf. Most every fruit grower will have observed this pest in his garden. Very often they strip the bush entirely. After maturity they enter the ground for transformation. There are two broods of this pest, the first appears in June and the next in August, the latter changing to pupæ before the winter sets in.

Remedy. Visit your currant bushes often after the leaves have come forth, and you will readily detect these pests. Ashes and dust will not kill them. When the larvæ are small the leaf where they feed in groups might be picked but if not disturbed till almost full grown syringing with hellebore or hand picking are the only remedies. Air slacked lime around the roots is a good remedy and helps to keep the larvæ from entering the ground. The pupæ may always be found in early May around the roots three to four inches under ground, and a good many may in this way be destroyed.

CLOSING REMARKS.

I hope I have succeeded with my rambling remarks in proving to you that these facts which have been presented to you to-night are very important to know and to understand, and that everyone who loves nature will join us in exclaiming: O, how wonderful is nature! Would we then not delight in the study of these works of nature?

It will not be difficult to show to everyone who asks the question, whatever his age, profession or pursuit may be, some benefits which these studies can bestow. They have one decided advantage over almost all others; they bring at once the body and the mind into action, since everyone who has anything of the naturalist about him, leaves his books and the narrow enclosure of his study and goes forth into the open field of nature. It is manifest that pursuits which

thus excite the physical and intellectual powers, remove the unnatural inconsistency, which perverted education has established between study and action. It certainly never was intended that while the mind is exerted, the body should suffer of inaction, nor was it any part of the design of Providence, that those who live by the labor of their hands, should leave their minds forever inactive and barren. It seems that the studies in question reunite what man has unwisely separated and are therefore best suited to our nature. The love of nature seems to be born in the soul of man; it strengthens with his strength; it has much power where it has never found a voice, among those who are thrown into familiar intercourse with nature. Even boys, the most merciless of destroyers, have their pet animal and show some humanity for their playful charge. The birds, too, not only the familiar robin, but the wild oriole and the retiring warbler, sing with confidence, believing that some will listen to them in the rattling streets, as well as in the Sabbath stillness of the village. Who does not rejoice in the spirit-like song of the bird, when he comes to assure us that spring has come; or when he hurries from the north, as soon as he hears afar off in the mountains the first murmurs of winter storms. He seems conscious of man's attachment; he lingers long after the last leaf has fallen.

The love of nature in life explains the fact that in our communion with nature, we never feel alone. We feel solitary when we do not find man among the works of man. A deserted house is one of the dreariest places in the world. But we feel no such overpowering sense of loneliness among the works of God; there is reverence and awe indeed, when man stands on the seashore, when he gazes on the expanse of the desert, or when he stands at midnight on the deck of a vessel in the heart of the seas. Why is it so? Because we are forced to reverence the works of Him who does all things well. Then let us say with Gœthe:

"Let us walk to yonder rock,
Where the waterfall leaps in the bosom below,
There on the rocky shelf, under the shade of the hemlock tree
Let us rest and repose,
And think of the wonders here below
Wrote by the hand of Him who knows
To reveal the wonders of the future."

THIRD DAY—FORENOON.

BUSINESS MEETING OF THE SOCIETY.

A meeting of the Society for the transaction of business was called to order at 9 o'clock, Vice-President Nelson in the chair.

Mr. D. J. Briggs in behalf of the committee to examine the fruit on exhibition, reported the names of exhibitors and the number of varieties shown by each:

D. P. True, Leeds Centre, two varieties of pears, and fine specimens of Swaar apples; Mrs. E. T. Spring, New Gloucester, four varieties of apples; S. Hicks, New Gloucester, five; L. H. Blossom, Turner, twelve; Charles F. Merrill, seven; Josiah Walker, Strong, a seedling to which we call the attention of the Society for further action; O. C. Nelson, New Gloucester, two, Hubbardston and Nodhead; W. H. True, New Gloucester, two; F. McCann, New Gloucester, eight; D. J. Briggs, South Turner, ten; J. L. Davis, six, four varieties with no registry; G. K. Staples, Temple, thirteen; J. H. Ward, New Gloucester, three; J. W. True, New Gloucester, fifteen; C. S. Pope, Manchester, four. In all there are one hundred plates on exhibition.

Many of the single plates are very fine. In our opinion the best exhibition is shown by G. K. Staples of Temple; the second best by J. L. Davis, New Gloucester; third by J. W. True, New Gloucester. We make special mention of a plate of Bellflowers, shown by C. A. Fogg of New Gloucester, also a plate of King Tompkins by Mrs. E. T. Spring of New Gloucester.

Mr. D. H. Knowlton, for the committee to whom was referred the president's address, reported, and the following recommendations were adopted:

That the executive committee make such modification of the exhibition rules as shall secure to our annual members such rights as they are entitled to in connection with our annual exhibition, and that the same be published with the exhibition rules.

That in case our annual exhibition is held with the State Agricultural Society, the executive committee be instructed to arrange a programme for the evening meeting proposed by the State Agricultural Society, and that the committee be instructed to announce the same by such advertising as may seem best to them.

That the executive committee make such revision of the premium list as may seem for the best interests of the society.

That a standing committee of five be appointed by the president, secretary and treasurer, whose duty it shall be to make a revision of the society's catalogue of fruits, and that the results of their investigations be furnished the secretary for publication.

That our Congressmen be requested to use their influence in securing the passage of the bill before Congress reducing the rates of postage on seeds, bulbs and plants sent through the mails.

That in the opinion of our respective bodies the rates of postage should be as low as the rates made for similar service in the Provinces and other foreign countries.

That the Secretary be instructed to forward a copy of the same to our members of Congress.

On motion of Mr. Atherton a vote of thanks was extended to the citizens of New Gloucester for their cordial reception extended to us, and their generous hospitality. Also to the Maine Central Railroad for reduced fares over their road.

Mr. Haskell of New Gloucester, expressed in behalf of the citizens, the pleasure the meetings had afforded them and thanked the two organizations that had presented to them so much useful and practical knowledge of fruit culture.

PUBLIC SESSION.

Hon. Z. A. Gilbert read a paper showing the results of his inquiries regarding the Red Russet.

THE RED RUSSET.

By Z. A. GILBERT.

Several years ago I had my attention called to samples of apples named Red Russet, and not then having any knowledge of this variety my interest was awakened at once and I proceeded to "read up" on this variety and post myself on its merits. The history of this variety, so far as known, is here given.

Supplementing the matter of history, I sought to learn the appreciation in which this apple was held by our fruit growers. Inquiry was made through the agricultural papers and resulted in the receipt of letters from various parties who were growing the fruit, some of which are given herewith:

In the appendix to the Agriculture of Massachusetts for 1880 is an extract from a report of a committee of the Essex County Society on fruit, in which it is stated that a variety of apples was referred to in the report of the committee of a year ago, said to have originated by a cross of the Baldwin and Roxbury Russet; and as little was known of its origin and some persons doubted the theory of cross-grafting, the matter had caused much discussion. Accordingly at a meeting of the trustees of that Society, the committee on fruit were requested to obtain information as far as possible as to the origin and value of this, said to be, new variety of fruit, and make report thereon.

The committee applied for information and received the following letter from W. H. B. Currier of Salisbury:

SALISBURY, MASS., July 17, 1880.

TO MR. J. HOWE.

My Dear Sir: Yours of the 2d inst., received; I regret that I was not present at the last meeting of the trustees, although I might not have been able to satisfy the inquiries made concerning the apple you speak of. The whole matter has been talked over with Mr. Hill some months since who has gathered many facts. Mr. Hill visited the farm where Mr. Lucy purchased his apples, and at the time they were stored in the cellar. Hill pronounces them the "Red Russet," and has raised them for several years. They originated on the farm of Aaron Sanborn of Hampton, N. H., who had an orchard of Russet trees, and Mr. Lewis Sanborn grafted them into Baldwins. All the trees so grafted, but one, bore Baldwin apples. From this one graft originated the Red Russet. This was about the year 1840, as near as can be ascertained now. Therefore it was what fruit-men sometimes call a "sport," a very unusual thing in fruit culture, but common among plants.

The Red Russet is remarkable for its keeping qualities, *under certain conditions*. It requires a cool cellar, and the apples must be headed up, or they are liable to "shrivel." It is a great bearer and a good grower, but I am informed it has one "out;" it bears only every other year.

The gentleman who raised the fruit is dead, but the facts were gleaned from his family, who only remember the grafting of the orchard and its results. One fact I failed to learn whether all the grafts upon *the one tree* were of this variety or only one or more of them.

Very respectfully yours.

W. H. B. CURRIER.

The committee go on to say:

"Some time last winter an article was published in one of the Boston papers saying there had recently been a meeting of the

Massachusetts Horticultural Society in Boston, and the subject of cross-grafting had been discussed for the third time, and that apples had been received from Mr. Geo. F. Eastman of South Hadley, a variety said to have originated by a cross of the Baldwin and Roxbury Russet; and we were informed that they were pronounced at the meeting to be the Red Russet."

"We immediately wrote to Mr. Eastman for information on the subject, and soon after received the following reply: His father many years ago planted a nursery, and budded or grafted it with various kinds of fruit. Finding a deficiency of Baldwins, he grafted or budded a portion of the Russets to Baldwins. When the trees commenced bearing, one branch of the Baldwin tree bore Russets; that branch was removed that the whole tree might be Baldwins. After this branch was removed, another branch which grew out of the tree directly above that which was removed and had previously borne Baldwins, produced what is now called Red Russet,—red and rusty, as one would suppose they would be, being a cross of the two kinds. They are said to keep as well as the Russet, and bear every odd year. Mr. Eastman sent us some of the apples which we carried to a meeting of the board of trustees of the Society in June, and they were pronounced the Red Russet."

It should be known and remembered that the committee making the above report were searching for information bearing upon the mooted question of the influence of the scion on the stock, and incidently only weave in this bit of history of the apple under consideration. Without in any way endorsing the claim here, not merely hinted at, but confidently laid down as the result of cross-grafting, we drop this report of the committee. It is the history of the apple we are now after.

In Cole's Fruit Book, published in 1849, is the following description of this variety:

Red Russet, large, flattish round; russet half covered with red; flesh firm, crispy, juicy; of pleasant, rich flavor; late winter and spring; great grower and bearer; new and promising. It seems to be a cross between the Baldwin and Roxbury Russet. Origin, farm of Mr. Aaron Sanborn, Hampton Falls, N. H.

Mr. Cole writing so soon after the introduction of the apple to the attention of the fruit-growing public may be relied on as giving the origin of the apple so far as it was known. Just how it "seems to be a cross" does not readily appear.

In reply to my circular letter, that lamented member of our society, Alfred Smith of Monmouth, wrote as follows:

Mr. GILBERT,

Dear Sir:—I will give you what little knowledge I have of the apple inquired after. The scions were brought into Monmouth from New Hampshire twenty years ago or more, by men who came into Monmouth and grafted an orchard on the farm of Charles T. Fox, in my own neighborhood. There is one tree grafted in an orchard in North Monmouth. It has not been much disseminated in Maine. I sent scions to a man in South China. It keeps as long as the Roxbury Russet. This is about all I can say of it. Truly yours,

ALFRED SMITH.

Dr. True of Bethel, wrote as follows:

Dear Sir:—I have raised the Red Russet for twenty-five years, but regard it as almost worthless. It cracks the worst of any apple I ever grew. Once in a few years they will not crack, but even then have no great redeeming quality. They will keep till summer, and may serve as a poor substitute for something else. I cannot advise any one to buy or graft this variety so long as there are others so much better. The only use I could ever make of it was to make sauce of it to go with green rhubarb. Yours,

N. T. TRUE.

Another correspondent writes:

NORWAY, Jan. 25th, 1883.

Z. A. GILBERT, ESQ.,

Dear Sir:—Noticing your inquiry in the Maine Farmer of recent date, desiring information about an apple known as the Red Russett, I have raised it for ten years, and think highly of it. The tree is quite as vigorous as the Baldwin, and I think more hardy; bears profusely alternate years, and lightly intervening years. It keeps in good condition much later than the Baldwin, and is a better eating apple, keeping sound to the core to the end. It is not cultivated to any extent, there being no bearing trees in Norway to my knowledge. It has never been on exhibition at our county fair, except by me.

It originated in New Hampshire in a very peculiar manner which I do not accept. [Here is reported the same statement before given.]

I think so much of this apple, were I going to set another orchard I should plant largely of this.

Please excuse my penciling as I am an old man and my hand is rather tremulous.

Yours truly,

R. H. RIFTEN.

Mr. S. R. Sweetser writes:

I have grown the apple for about twenty-five years. The tree is a very stocky and rapid grower, resembling the Baldwin in this respect. A large part of the fruit appears to be genuine Baldwins, while others on the same tree are inclined to be rather coarse and russetty.

The following was received from G. H. Andrews, Esq., of Monmouth:

MONMOUTH, Jan. 18, 1883.

Mr. GILBERT.

Dear Sir:—In Monday's Lewiston Daily, I noticed an item from you respecting an apple called Red Russet. In my young orchard I have a few trees of that variety. None have fruited as yet, but one. It bore something more than a peck last season. The tree resembles the Baldwin in very many particulars, so much so I had taken the tree for a Baldwin, the shape of tree and leaf and the color being the same.

The fruit bears a striking resemblance in shape and color, still there is a difference in both flesh and skin. The flesh is finer grained and closer, of a rich color. The rind or skin is a little thicker, tough, more like the common Russet. Color, russetty brown and red. I am of the opinion that the fruit would be preferred to the common Russet. As to fruitage I am not able to speak. From the appearance now of those I have on hand I should say they were good for keeping.

Mr. Andrews has more recently informed me that he is now growing this fruit in considerable quantities and he states that it is doing as well by him as the Baldwin.

NEWBURGH, N. Y., Nov. 30, 1883.

FRIEND Z. A. GILBERT:—Your letter at hand, and am very glad to hear from you again, and in reply state that the Red Russet has not been cultivated here to any extent, and only for home use, and is much liked for its late keeping qualities, and that is what I recommended it for. It is much like the Baldwin in quality and color, except that it is considerably russetted. It keeps as well as Roxbury Russet, and is of better quality, and I would think sell better in the market; and if it succeeds well in your State, it will no doubt prove a valuable apple to ship to Europe. I have long thought that apples grown in Maine would be better for shipping than those grown here, yet I think the quality not quite as good.

Very respectfully,

CHARLES DOWNING.

Hon. Rufus Prince, President of the Maine State Agricultural Society, followed with a valuable paper.

WILL THE PRESENT OUTLOOK WARRANT THE ENCOURAGEMENT OF FRUIT GROWING IN MAINE?

By Hon. RUFUS PRINCE.

There are several questions that enter into a paper upon this subject which must be answered in the affirmative if we are to encourage fruit growing to any great extent.

First. Can fruit be grown with certainty of ripening in this State? All will doubtless with one accord answer in the affirmative.

Second. Are our soil and climate adapted to fruit growing? The answer to this may need some qualifications. If we take the hardier varieties of not only apples but pears, cherries, plums, etc., no part of the civilized world is better adapted to raise them than our State. If we are to try fruit growing upon a large scale we must not be captivated by stories told of the excellent qualities of new and untried varieties, neither can we expect one variety to succeed well in every climate for a variety may be without hardly a fault in one locality and be nearly worthless in another; for instance, the Baldwin is perfectly at home in its native soil of Massachusetts while with us it must have a favorable locality or it will be found to be black hearted and unsound. In the former State it has hardly a fault while in our latitude very few trees can be counted as entirely sound, and thousands of dollars' worth are killed outright yearly. Still with us it is, in favorable localities, perhaps, our most valuable apple.

Downing well says that "the apple is the world renowned fruit of temperate climates. There is no other fruit that is so universally used or generally esteemed." It is without doubt the last fruit to be spared, it being the best for all purposes raised in the known world. Its keeping qualities, its many forms in which it may be and is used, the many forms it is preserved so that it can be transported to all parts of the world, render it valuable beyond any other fruit. With a fruit such as this shall we say that we cannot compete favorably with others? Is not Maine better adapted to compete with her sister states in growing late keeping apples than in any other crop? If not what is the crop? I believe that if we cannot compete in this crop we cannot in any. I believe that nature has fitted our State for the purpose of growing late keeping, hardy varieties of apples, and if we compete in the crops that nature intended we should, we shall succeed. Cannot we rely upon as good returns for the labor

spent in our orchards as from other parts of our farms? And if so, is not the future outlook such that we, who have had nearly a life-long experience in fruit-growing can encourage the young man to extend his orchards? or shall we say to him, raise fruits sparingly?

It is but a few years since that our market for fruit was only our large towns and villages in our immediate vicinity. Later it extended to our larger distant cities and occasionally buyers came among us to purchase for other more distant markets.

Gradually new markets opened until now State of Maine fruit is quoted in the price list of many a foreign city and quoted too, higher than that of any other State. New outlets are opening so that to-day, no fruit-grower has any fear that he cannot sell his surplus. The only question is the right time. Late keeping Maine apples stand at the top of the market in the larger foreign cities, and if we put them up honestly we may be as sure of selling them at paying prices as any other crop we raise upon our farms. With our new markets, with our proximity to the seashore, where we can easily ship to any market in the world, I feel like saying to the young man, not the language of Horace Greely, "Go West," but "stay in Maine, set out an orchard and when that one is set, try another and another. Make it a life business and you need have no fears but what success will crown your efforts." The great drawback to us, as Maine farmers, we were brought up to do business on too small a scale.

Our ancestors commenced farming with about one hundred acres each and these divided between woodland, pasturage, grass, grain, roots and orcharding having a small area of each, and this idea of small farms has been handed down from generation to generation until the idea of that size has become so fixed, that if any one increases the number to even double that amount with half a dozen acres devoted to orcharding he is known as a *great* farmer.

Now transport the Maine boy to the west where everything is changed and you will soon see him changed to correspond with the place. You will soon see him with his hundred acres of corn, the same in wheat, hundreds of head of neat stock, swine almost without number and we at home stand with open mouths and hear with wonder the stories told of the amount he raises (but always with little reference to prices); of the wealth he is accumulating.

Now, brother farmers, if we expect to make any march in farming we must extend our operations. We must imbibe some western push. We must not expect to be successful in trying to make auger

holes with gimlets, if we do, we shall after trying through life in the end find our mistake and feel disappointed, feel that our State is only fit to emigrate from. If we could put the same energy into orcharding in Maine that they do in grain raising in Kansas, would it not be said that Maine was not only a good State to emigrate from, but to?

Suppose, Mr. President, that your, at present, comparative large orchard of a score of acres extended from your humble home in Manchester to our State capitol, a distance of four miles, that in riding over the hills between these two places in the spring time, as far as the eye could reach nothing could be seen but the pink and white apple blossoms of the great Pope orchard. Could there be painted a more beautiful panorama? If so, it would be a painting of the same orchard in autumn loaded with luscious fruit of all shades from white to the darkest crimson. While we should look upon an orchard like this one of enormous size for our State, it would be insignificant compared with some of the wheat farms of the great West. Still, Mr. President, when you stood and saw train after train loaded with the product of the great Pope orchard you would be not only the most independent man in the State but you would be the envy of the most successful in any other walk in life.

Were I to live my life over again with my ideas of to-day, it would be devoted to orcharding. It would be the height of my ambition to have not only the largest but the best fruit farm in my native State. To see car after car-load of my fruit leave for foreign markets. In short, to be the great apple Prince of Maine.

Does any doubt that it would pay at least as well as any other industry? If so I would like to have him stand up and tell us why. There is a large and yearly increasing foreign demand for Maine apples. If we wish for this demand to increase, if we wish to not only keep up our reputation, but even gain a better one, we must do at least two things. First, be ready to supply that demand so that other markets will not be sought. Second, always have our fruit what it is represented to be, not have a purchaser upon opening a barrel of apples find No. 1 on top and 2 or 3 in the middle. I fear that unless something is done to prevent cheating in putting up our apples for foreign markets our reputations must suffer and our pockets with our reputations.

Do we not complain when we find molasses that we purchase for first class a large per cent glucose, our spices, sugars, teas and coffee largely adulterated?

When, brother fruit-growers, you feel tempted to deacon your apples, think how you feel when you think you purchase good coffee and when you drink it and find it largely some cheap foreign substance. I would like to see our granite hills not dotted but rather covered with orchards, so that when in bloom they would be one large bouquet. Would there not, if there were fifty, yes, one hundred, bearing apple trees in our State where there is now but one, be buyers from all parts of the civilized world, scouring the country to purchase our fruit and would not Maine be one of our richest States?

I would by no means advise all to try orcharding upon a large scale, for many would not succeed, for a person must have a taste for it the same as for any other calling.

When I have a man at work on my farm and I see him, while mowing beside the wall, mow down without noticing fruit trees that I have carefully left, I do not advise him to set an orchard, but when I find every little tree in his swath left and carefully mowed around, I can say with confidence, young man, buy you a farm that is natural orchard land and raise a nursery, or set all the trees you can raise or purchase and you will soon have an income that will astonish the man with his money at interest. Doubtless many will ask how they can keep up the fertility of so large an amount of orcharding. Pasture with sheep and swine and you will have better apples than in any other way, less worms and borers and no mice.

As experience in anything is better than mere theory I will simply say that although the past year was an off year in orcharding, still my fruit raised in sheep and swine pastures will bring me in the snug little sum of seven hundred dollars. On the orchards from which nearly all my fruit was raised there has not been fifty dollars' worth of dressing used for the past fifteen years, except the droppings of the sheep and swine as they have been pastured therein.

Cannot the Maine State Pomological Society in view of our peculiar adaptability for growing the hardier varieties of fruit, our facilities for transportation, both by land and sea, in view of our healthy climate, our schools and churches, our most excellent rural population, our freedom from pestilential sickness and western cyclones, say in confidence to the young man, "stay in Maine and make an extensive business growing fruit?"

DISCUSSION.

Mr. ATHERTON asked whether the origin of the Red Russet was from hybridizing or from ingrafting.

Sec. GILBERT. I understand that the opinion of those who have investigated the matter is that it was simply a sport in the first place and from that sport there had been propagation into other trees and thus it became an established variety.

Mr. SWEETSER. I exhibited at our pomological show one year some of the apples which some of our best informed men pronounced genuine Baldwins; and others of which they did not feel certain but which they pronounced Roxbury Russets, saying they hardly knew whether they were so or not. When I sold my apples year before last I put most of my Red Russets, except the most russetty ones, right in with the Baldwins. Nobody could tell the difference.

MR. MERRILL. I think the Red Russett is a good shipping apple. I have had some experience in shipping Red Russets this winter. I have been buying in the vicinity where this Red Russet originated—in Salisbury, Northampton and Exeter. In one purchase that I made, of 352 barrels, I think 50 were Red Russets. I objected to the Red Russets for this reason: Not being known in the Liverpool market, I thought it would be difficult to sell them. But they resembled the Baldwin so much in quality and color that I concluded to buy the lot and stencil them Baldwins, and I must say the 352 barrels proved profitable; they sold well; there was no complaint of there being two varieties. I thought it would be well, in the season of Baldwins, to stencil them Baldwins. I thought no one would be cheated in buying them for Baldwins, for they were of good form and color, and I thought they would stand well. They resembled the Baldwins so much that I thought I would risk it. They looked more like a Baldwin than a Russet. I decided to mark them as Baldwins.

Question. How did they compare in quality, for eating?

Mr. MERRILL. I am not an expert in the flavors of apples, but if I were going to buy a barrel of apples to use I would take Red Russets as quick as Baldwins, and even quicker if I were buying to eat later in the season.

Mr. BLOSSOM. I think we had better take up the next paper which I believe to be of more interest to us as a fruit growing com-

munity than the one variety of Red Russets. I was very much interested in the second paper, knowing that the worthy gentleman has told us some of his valuable personal experience. I can remember when that gentleman set his first orchard. Most of us can remember when we reckoned our crops of apples by the bushel and the man who raised a hundred bushels of apples was almost an apple king. Then we began to reckon our crops by the barrel. Now we reckon by the car-load, and the more we raise the better they sell. I think, as has been said, that the outlook is good for fruit-raising in Maine, and that all our hillsides should be covered with fruit trees. If you could go through our town and see where the honorable gentleman lives, you would find that he has carried out to the very letter the advice which he has given us here to-day. After he got his first orchard started he set out another, and not being satisfied with that, he has tried to buy all the land that joins him and set that out in orchards. He says, "Boys, stay at home; do not go west." I shall heartily concur in that. I have been there and know what it is. I was satisfied; did well, but I came back here and I am satisfied. I took the advice of the honorable gentleman in setting out an orchard and kept at it. The more apples I raise the more I want to raise and the better they sell. And I say the same to you; set out an orchard; beautify your homes in that way and you will keep your boys at home. Keep them out of the cities; they don't belong there; they belong on the farm.

Interest your boys in fruit growing and they will not want to go away; they will stay where they belong, at home.

Mr. BOARDMAN. The name of S. W. Cole has been mentioned. Every fruit grower in Maine owes much to him and his early efforts in regard to fruit growing in our State. We want to honor him as a Maine man. He was born in Cornish, York county, in this State. I was glad to hear his name mentioned here, because, as I have said, he is a man to whom we owe a great deal and we honor him as a Maine man.

Sec. GILBERT. I appreciate Mr. Cole's efforts. We who are here to-day owe our success in fruit growing more to his wise counsel than to that of any other man known among us in those early days.

I would like a moment of indulgence further in regard to this subject of the Red Russet, as I would like to have this history complete as we have now made an attempt to put it on record. I believe Mr.

Augur has some information in regard to the apple and if he will submit it now it will be a pleasure to me.

Mr. AUGUR. I think the Baldwin has its defects, even in Connecticut being killed once in a while during an exceptionally bad season. Yet we find that to have an orchard the most profitable it should be all Baldwins. But knowing the defects of the Baldwin apple the question has been in my mind for several years, what can we look to to take its place? There may be an improvement. We ought to have an improvement. We ought to be getting hold of something in case we should find, by heavy losses, discouragement sufficient to almost discard the Baldwin, when we should want to fall onto something else. For some years we have had the Red Russet in our nurseries.

All I can say personally is in regard to how it has behaved with us. As a nursery tree we like it; we like its habit of growth; and from what experience we have had I shall be inclined to give it the preference over the Baldwin. It has grown beautifully with us, and I have said to people: "Here is something that purports to be a cross between the Baldwin and the Roxbury Russet. Why don't you try it?" We have offered it at the same price, of course, as the Baldwin; but we find people exceedingly slow to take hold of a new thing. We want to be on the alert, and if there is any improvement in prospect or any probability of it we want to be on the lookout for it and have the advantage of it.

In connection with the admirable paper which Mr. Prince has given us, it seems to me that, while it undoubtedly would be well to be cautious about making any large ventures at first, until you are sure of your ground, it does seem to me that the Red Russet, from what I know personally and from what I have heard of it, is one worthy of a fair trial in this State. And it may be that you will find it of sufficient value to adopt it as one of your standard apples, if not the standard apple. Because a healthy vigorous tree whose fruit has the merits that have been described here including that of being a late keeper, has strong points to recommend it to the people of Maine it seems to me.

You raise apples that surpass ours, at least judging from the beauty and color of your fruits here. My own experience would rather lead me to think that the Red Russet is not quite equal in size to the Baldwin; but in perfection I should think it was fully equal and

it does seem to me that the tree has an advantage over the Baldwin though I do not feel fully confident of that.

Sec. GILBERT. Allow me to add a few words which I thought best to omit from the paper read, in regard to what I have learned from personal observation and conversation here in our own State. Since I have had the matter under inquiry it has been my purpose to learn all I was able to in regard to the character and habits of growth of this tree and the merits of its fruit. I find it scattered around in various sections among the orchards of our State, grown to a limited extent, and yet the testimony in regard to it is universally the same and such as has been brought out here. The wood is not the Baldwin wood; it is a finer grained, firmer wood, corresponding very closely with the character of the fruit itself as compared with the true Baldwin, a firmer, solider, heavier wood than the Baldwin. To me, therefore and those whom I have consulted, it appears to be a rugged healthy tree, in form and general appearance very much like the Baldwin and in bearing properties very similar. So far the apple has no distinction in the market; they pass as Baldwins, as Mr. Merrill has stated, without question on the part of the purchasers. The distinction of apples borne on the same tree, I have not been able to find to exist generally, only so far as color is concerned and the russetty appearance. There will be a difference in that respect; some will have a clean, smooth skin while others will be russetty; and generally the red is deeper than that of the Baldwin.

Mr. SWEETSER. I would like to hear from Mr. Augur something in repect to the apple maggot.

Mr. AUGUR. I will say in reference to the codling moth, as an introduction, that within a year or two we have settled upon it as a rule to spray our trees pretty thoroughly with either London purple or Paris green, it doesn't matter which. We have been exceedingly troubled with the apple maggot; so much so that it has broken our confidence in some varieties of apples, so that we have hardly dared to sell them, we have found them so generally affected by the apple maggot. We have found, as it is admitted now by everybody, that a spraying with some arsenical poison is a complete, or very nearly complete, remedy against the codling moth. The matter of spraying we make a very thorough one, perhaps more so than we need to; but I think the trees ought to be sprayed two, if not three times, to be perfectly sure of getting 80 or 90 per cent of the apples free from worms. Last year our orchards bloomed well, and we gave them a

very thorough spraying. To our surprise, those varieties which had hitherto been badly affected by the apple maggot, last fall we found almost completely exempt as they were from the codling moth. We found occasionally a specimen, enough to show that we still had it, but not enough to interfere with the marketing of the fruit. It is said that one swallow does not make a spring, and I would not say but our exemption from the maggot may be due to some circumstance that we do not understand. It is not proved yet that it is owing wholly to the application of the poison to our trees, but we are strongly inclined to think that that had a considerable influence. If we know just how the insect feeds and the season of its appearance and disappearance, it will be of great benefit to us. I think there is something in this that we should be able to get hold of, and, at present, I should say without hesitation that I have so much confidence that the insecticide had an effect in ridding us of the maggot, that if the codling moth was entirely gone, I should still use the poison for the apple maggot, not knowing anything better to do. It seems, as far as our experience is concerned, as though we had nearly escaped it.

Mr. SWEETSER. Would you recommend using the spray as late as this small fly works on the apple? I find them at work on my yellow transparent apple a very short time before they are ripe. I think on some of these early varieties they work until they are ripe, and it seems to me that it would be dangerous to spray the apple so late as that; that it might carry away the poison.

Mr. AUGUR. That is a matter that should be thought of. I think on the early fruits I should object to using the poison just before ripening. And just in that line I would like to say a word. There is quite prevalent among fruit growers a prejudice against the use of the poison at all, lest there should be some evil results from it. Dr. Jenkins, of the Connecticut Experiment Station, was present at the meeting at Norwich a year ago last winter, and I asked him if he would not study into the matter and give a little report on the possibilities of poisoning from the use of Paris green or London purple on fruit trees and potato vines. He made some estimates in regard to it and gave this as his statement. He says, "if you use a pound of Paris green to the acre every year for twenty years there would not be enough in a square yard of the earth as far as the soil goes, to be a medicinal dose for an adult person, if the whole was active;" "but," said he, "in any soil that contains any admixture of iron the

arsenic is neutralized in a very short time so that it becomes inert." So, taking these two things into consideration, there was no possible ground for fear of using these poisons to any reasonable extent. And a pound to an acre I believe is sufficient at all events, for a teaspoonful of Paris green, if it is strictly pure, is sufficient for a pail of water, and that would be all sufficient for one tree, and perhaps more than enough unless the tree is of pretty good size.

Mr. ATHERTON. Professor Cook recommends the spraying of an orchard with a pound of Paris green to a hundred gallons of water; and he advised the use of a powerful garden force pump for its application. I would like to inquire how much water you would use to a pound, and what kind of a force pump. And also, as I raise hay in my orchard, would there not be danger of poisoning the hay, as the grass will have grown to a considerable height at the time the poison should be applied? Some of my trees are very large and I know it would take more than one pailful of the solution to spray one of them.

Mr. AUGUR. The pump we use is a Whitman fountain pump. Perhaps you know what it is. There are two or three pumps very similar. It is a pump where you just put the hose into the barrel and work it and it throws a fine spray. We like to get somewhere near underneath, so to have the spray go up through the tree. As to the amount of poison, I will say, in answer to your question, that when we have mixed it in a barrel we have mixed about eight ounces to a forty gallon cask of water, which would not be very different from what you speak of. But it must be understood that Paris green is not always Paris green. There are three or four brands that are known to the wholesale trade to be strictly pure. If you get one of those brands you get the pure article. There is one brand that is marked by the deceptive name of "genuine" that is not pure and is not claimed in the trade to be pure. There is a brand called the "King's County" and another called the "Long Island," all of which represent different degrees of adulteration, so admitted in the trade. It depends very much on whether we are using a strictly pure article or one that is adulterated. I think that eight ounces of strictly pure Paris green to forty or fifty gallons of water is enough. I know in some instances it has been used so strong as to injure the foliage of the tree. That, of course, we do not want to do; it is not necessary.

Mr. POPE. We sprayed quite a portion of our trees last year by placing a barrel in an express wagon, with a force pump in it, and

driving around under the trees. The solution was mixed according to the recommendation of Professor Cook, a pound of Paris green to 100 gallons of water, as near as we could estimate it without weighing, and the leaves were badly scalded.

Mr. AUGUR. That shows that it was too strong. You probably had the strictly pure article.

Mr. POPE. The Paris green was too good?

Mr. AUGUR. Too much of a good thing. I omitted to answer one of Mr. Atherton's questions, in regard to poisoning his grass. If I had a field of grass just ready to cut, I shouldn't want to use the poison on the trees there. It is better to be on the safe side. I think you ought to apply the poison to the trees a little earlier; not wait until the grass is nearly ready to cut. The rain which we usually have would be sufficient to wash it off if it stands a sufficient length of time.

Mr. ATHERTON. There would be the same objection to using the poison if I were to pasture sheep in my orchard.

Mr. AUGUR. I should not want to use it in a sheep pasture unless the sheep were kept out for a while.

Mr. POPE. Just a word of caution as to the use of Paris green, as two of our men were badly poisoned from inhaling it. I think it is not safe to use it without a wet sponge over the nose. Three of us were using it; one led the horse, one used the pump, and one directed the nozzle. We drove along by the side, and once in a while the air would waft it towards us.

Mr. ATHERTON. Professor Cook recommends keeping to the windward of the tree you are spraying.

MR. POPE. You cannot depend on the wind to carry the spray away from you altogether. We were careful to keep to the windward side, but we had two bad cases of poisoning.

AFTERNOON SESSION.

A large audience assembled to listen to the paper and discussion on "Small Fruits and Their Culture" by Hon. P. M. Augur, Pomologist to the Connecticut State Board of Agriculture, who was introduced by President Pope.

SMALL FRUITS AND THEIR CULTURE.

By Hon. P. M. Augur.

God in his overflowing goodness has bestowed upon us numerous mercies, not the least of which are beautiful flowers and our excellent summer fruits. These are specially adapted to the season in which they come, and to our needs at that time. The law of adaptation is seen everywhere. Note the fur of the seal and polar bear with walrus fat for the needs of the Esquimaux; the citrus fruits with their delicious acid for the people of the sunny south; and the beautiful, luscious summer fruits for us of the temperate regions, all good in adaptation in their time and place.

The great development of small fruit culture has taken place almost wholly during the recollection of some of us. Those of you who have passed your sixtieth year will hardly remember the strawberry in the old home garden as a cultivated crop; while the same in the village market was an unheard of thing. Now the long trains go thundering along the great railways bearing hundreds of tons of the delicious fruit to the great city markets; not now as a mere matter of luxury, but indeed as a necessary table supply.

Let us look for a few minutes at the intrinsic value of the strawberry. If we were on the verge of starvation probably we should welcome a few barrels of flour more heartily than so many crates of strawberries; and yet in "the good book" it is written "man shall not live by bread alone."

I have in my mind's eye an invalid, sick for some two weeks with that dreaded disease Typhoid; her doctor has told her friends he can do no more and they must be prepared for the worst. A kind neighbor in the fullness of her heart sends in a little dish of beautiful strawberries in the full fragrance of the morning. They are placed upon the bed by the sick girl; their beauty and fragrance awaken a new yearning for life, and now for the first time she desires to take one in her fingers, it finds its way to her mouth with another and another, and in short the turning point is passed, the doctor finds a change for the better and in a few days her merry laugh resounds through her home, and that good neighbor is assured that when life was trembling in the balance she threw in the make weight that turned the scales toward returning health.

The excellent effect of fresh wholesome summer fruit is admitted by all; it is not merely a luxury, but a factor in the health problem not to be ignored; the strawberry has also become a commodity in the markets which cannot be omitted; pecuniarily it reaches up among the millions; by it the death rate is largely reduced and society made happier and better.

Therefore we need make no apology for consuming a half hour in this meeting in the discussion of this subject.

The question arises, who shall raise small fruits? We answer, all who have a rod of land at all adapted to the purpose, not of course all for market, but a good supply for home use of all the small fruits that are adapted to this soil and climate. I like to see in every young man a laudable ambition to have a home and family of his own with beauties, comforts and luxuries of his own production, and not the least of these are the choice and abundant supplies of small fruits that grace his table from June to September.

The prominent small fruits are the strawberry, cherry, raspberry, currant, gooseberry, blackberry and grape; these are all adapted to a wide range and in multitudinous variety. As this is a wide range I shall at this time confine myself chiefly to the strawberry, raspberry and blackberry, holding myself ready to answer any questions so far as I am able in regard to the others as they may arise in subsequent discussion.

As the strawberry stands first in the succession and perhaps first in importance it claims our first attention. I well remember a remark of a grand old farmer who made the corn crop a specialty, which was this "when I have my land nicely plowed, manure spread and harrowed in and the land checked off both ways for planting, I consider the crop half raised." I had almost said it about the strawberry, but on reflection can not, for it would not be true. Still the work of preparation is a large part and a most important part of strawberry culture.

The land which has given us the best results is a deep strong loam overlying an impervious hard-pan for sub-soil; and our mode of operation is this, first removing all stones and stumps from surface on land yielding about fifteen hundred pounds of hay to an acre, this manured, plowed and planted to corn giving an average crop; second year, potatoes do. Now all surface stones are again removed, land under-drained the ground covered with twenty-five cords per acre of composted or fermented grain-fed horse manure; it is now plowed

as follows, surface plowed ten inches and every stone within reach removed. Now then we have in first cost of land $100, and in addition $200 in drainage and manure.

But with this we have the drainage and aeration three and a half feet deep, with soil broken twenty inches deep and the two years' clean cultivation ridding the land of many weeds and nearly all the white grubs. This land thus made in readiness we plant to the strawberry.

Now what varieties shall we plant? Here we have two requisites to look after, productiveness and quality. If quality alone were to rule, the list would be about like this: Duncan, Black Defiance, Gipsy, Hervy Davis, Gold. While for market according to our own convictions, for early, Crescent; medium Sharpless. Lida; medium to late Belmont, Jersey Queen, and Jewell, and yet some would widely dissent from this list, and while those varieties do wonderfully in some places, they almost fail in others. On the whole there is no better way than to consult experts in your own neighborhood who give about the same soil and culture with yourself.

There is no use in trying to shoot a seventy-four pound ball out of a pistol neither can you raise a Lida and Jewell on drifting sand. For a poor man's berry or a lazy man's try the Crescent fertilized by Wilson or Charles Downing.

With land prepared as we have indicated I would advise planting as follows, adopting this principle, viz: let varieties alternate, believing that cross fertilization is better than close fertilization. With bi-sexual varieties this has not been deemed necessary, and yet it is a fairly debatable question whether the Sharpless or Charles Downing do not do better with rows of Belmont or Cumberland between them than alone.

We do not consider this point actually verified and yet it is strongly probable. With pistillates, of course some good bi-sexual is needed. One plan which has been highly successful is as follows: As we depend largely upon the Jewell, a pistillate, as our market berry, upon first row plant Sharpless; two, three, four, Jewell; five, Belmont; six, seven, eight, Jewell; nine, Sharpless and so on. Thus the three rows of pistillate whatever they be, have a choice between two somewhat diverse bi-sexual kinds; and the laws of sexual affinity have wider range than otherwise you may think; it pays in dollars and cents.

Having settled upon kinds to plant a favorite plan with us is to plant in rows three feet by two feet. Allow each plant to make only two new plants being thus repressed by cutting off all surplus runners. Enormously heavy plants are the result which have many crowns and yield heavily of very large berries. This plant applies to spring planting while August planting should be twenty by twenty or eighteen by twenty-four; runners kept cut. This at twenty by twenty would require 15,642 plants per acre and as we have exceeded one quart per plant on a 1.22 of an acre you can estimate what a yield that would be; 488 bushels per acre, are plants set in August 1st, not potted but layered (potted.) Now you will please understand we do not always plant in this way; as we have constant orders for plants we have been obliged to do in a way that would give many plants as well as much fruit, but we have tested the method sufficiently to judge its merits.

And right here I desire to emphasize the matter of under-drainage as one of special importance where good natural drainage is not found, by first removing superfluous water and thus adding several degrees of heat to the soil; second, by improving the capillary or porous condition of the soil. This point I fully believe is not well appreciated; in order to have nature do her perfect work air must permeate the soil; some of the most important functions of plant life and soil adaptation depend upon air in the soil, while water is the great solvent and very essential, air is no less so. But I fancy some one will ask ' is there not danger by thorough drainage of losing too much water from the soil?" Unquestionably there are periods when long and severe droughts prevail, when irrigation would be a great advantage not only on drained but on undrained land. And yet I have found that land in the best porous condition always withstands drought best. Therefore, were I anticipating a severe drought I would take my chances on the land well drained, trusting to the greater absorbing power at the surface and also in the better capillary absorbing power below, together with the deeper root-growth always found in land well drained and sub-soiled. Again, by underdraining and sub-soiling thus aerating the soil for two feet or more, we render available the plant food, specially of a mineral nature like lime, magnesia, and potash, to so much greater depth, that we add largely to plant resources or soil resources.

When I was a young man I commenced farming on a badly run down farm. A friend looking over the farm with me, said, "well

Phineas, you have got another farm right down underneath here that will be all right when you get hold of it." I didn't feel at the time enthusiastic over that lower farm joke, but there was a good deal of truth in it after all.

Another point which deserves more than a passing notice is the increased earliness of fruits or vegetables on a well drained soil. Our experience leads us to believe that from four days to a week may safely be counted on as the advance ripening of the same variety of strawberry on well drained over undrained land on same soil and exposure. This often means better prices as well as a better yield and a longer season.

Another point for which we ask your special consideration is the need of the best facilities for doing work.

As you are fully aware, the cost of all manufactured goods depends much upon the facility for doing the work. The best quality, for the least manual labor is the desideratum of the mechanic. This also should be our maxim. Hence money judiciously expended in removing all obstructions that would impede rapid culture is capital well invested. Farms and farm buildings should be arranged with this as the prominent idea; so too should fruit fields and packing houses. A stump or boulder, which has been an obstruction for years, had better be removed and thus offer increased facility for speedy work.

Another good practice is the occasional plowing in of some green crop, clover being the best as it adds plant food in a readily available condition beside greatly improving the mechanical condition of the soil. But one of the most important factors in the successful growing of small fruits is the generous and judicious application of manures.

If a manufacturer proposes to turn out a large amount of finished goods, he must have a corresponding amount of raw material. this is self evident; it is no less evident that to produce heavy yields of superior fruit, a generous supply of plant food in its most digestible form must be at hand. Well, the question arises, what? I think the manure of grain-fed horses properly composted and fermented excellent. Manure from the poultry house properly handled and fined down is most valuable. Contents of the privy-vault and earth-closet properly reduced and triturated are excellent. Standard Peruvian guano is always good. There is no way in which fish can be so well applied as to pass through a thorough composting and fer-

mentation; bone and ashes mixed, dampened down and remaining a few weeks covered with sufficient earth to decompose, form an excellent manure. There is no form in which potash can be applied so well as in good, unleached wood ashes. Caustic chemicals if applied at all should be used with extreme caution; an overdose of nitrate of soda may do positive harm.

Special strawberry manure of any reliable firm is useful but more so if applied very early in the season so as to become thoroughly diluted and incorporated with the soil before the active growing and fruiting season. No one rule, or formula, can have general application in applying manures, so much depends upon the special deficiency in any given field. Special manures and commercial fertilizers are valuable to supplement our home manures, but we should not depend wholly upon them. We should on the contrary plan to keep as much farm stock as may be compatible with our circumstances with special reference to the manure product. Josiah Quincy, I think, gave utterance to the statement that a "cow's droppings were worth as much as her milk." That they have great value we fully appreciate. Cemented gutters with plenty of absorbents will enable us to save more wisely these valuable products, specially good for small fruits. A large vat fourteen by twenty feet, by six feet in depth with drains from stables and barn-yards to a connecting reservoir with pump is an arrangement affording the best facilities for using liquid manure in compositing and fermenting all coarse material that needs decomposing and nitrifying.

In these days, when the manure problem is one of the hardest problems to solve, we must avail ourselves of nature's forces, which are waiting to be set to work, and use them for all they are worth. As the proper action of yeast upon dough is a great aid and factor in good digestion, so we believe the proper action of ferment germs or microbes upon crude manures is a most salutary work, and should be more generally secured.

As this paper is somewhat fragmentary, I will touch upon a few points that I consider important. First, Do varieties wear out? Yes. How soon? It depends upon treatment. Suppose A and B are neighbors; they both grow the Sharpless strawberry. A selects plants from his best stock that have not fruited, cuts off all blooms, gives good culture on good land, weeds out all mongrel plants; and thus, year after year, intensifies all the good points of the kind. B, on the contrary, takes his plants from old stock that are de-

pleted to exhaustion, allows them to fruit what they will the first season, and soon his stock is run out. Now if B's plants have any value, A's have ten times greater value, at least we would advise buying plants from A, but would not accept them as a gift from B. So varieties may run out quickly under bad management.

We would try strongly to dissuade any one from trying to get a second crop from the same plants, as a small crop of inferior fruit neither brings profit nor reputation; therefore try for a large crop of fine berries, and after the crop is gathered, plow under at once and rotate with a different crop.

Again we urge a suggestion before your organized agricultural and horticultural societies, to wit: in connection with awards, offer if you choose, a first and second premium for the best ten square rods of strawberries and raspberries, size, quality and yield to be considered with a detailed verified statement to be reported.

THE PICKING OF STRAWBERRIES.

This may seem unimportant to many, but the results of a crop depend much upon careful handling. Expert picking requires apt fingers and good judgment. Each berry should be picked at the right time. Unripe berries and over-ripe berries should never be found in your crates. The green hull should never be detached from the berry, and berries should never be massed or squeezed. Berries in this condition put into a cold room at fifty degrees may easily be kept over Sunday and go into market Monday.

A very important point in picking is not to disturb or injure the foliage or green berries. Let your berries go into market in such condition as not to discredit your name which may be prominent on the crate.

MARKETING STRAWBERRIES.

Of course very much of the profit in strawberry growing depends upon having a good near market of sufficient demand to consume the crop speedily as it goes into market. This is specially a crop where overproduction may involve loss as the strawberry is a quickly perishable fruit. Therefore if those in a given locality who have all the requisites for the business supply the demand already, we advise caution about engaging in the business there. If fifty crates per day supply the demands of a given market at a price not less than ten cents per quart, the addition of ten crates more may bring the

price down to six cents per quart so that the addition of the ten crates involves a large actual loss, by breaking the market. Therefore it is always safe to have an overflow market, even if at less figures, to save your local market.

Again it is best to excel in raising berries of extra size, beauty and quality. When a market is glutted the small berries suffer worst. John White and James Brown raise berries for market; White's berries average thirty-five to the quart; Brown's average one hundred to the quart; White has a larger yield and gets twelve cents per quart average. Brown has a less yield and gets an average of seven cents per quart. White has a quick demand, Brown's go slow. White comes home from market looking happy, Brown brings home a long face. Now whose place will you fill, that of White or of Brown? I leave that for you to answer. But remember Daniel Webster's advice to a young lawyer who asked him if there was any more room in the profession, "Yes, plenty of room higher up."

MULCHING.

This is a practice I need not explain to you; but I assure you one of great importance. Where your land is covered with snow till April, it is of less need than with us in Connecticut, where we have more open weather in winter; and yet the plants often suffer most during the frosty winds that prevail in spring after snow is gone.

When the ground ceases to freeze nights you can remove the mulch (two tons of coarse hay per acre) and find last year's foliage looking fresh and green; here is a strong point in your favor; when this is done the ground should have one perfect shallow hoeing and weeding, then remain free till the green berries commence to change color; at this time put back enough mulch to keep the berries perfectly clean. Leave it there till the crop is gathered, then turn mulch and plants right under and seed to grass or any other crop.

FARMERS' FRUIT GARDENS.

On my way to New Orleans Exposition in passing through Alabama, as we saw negro quarters frequently and many dusky faces peering at us, I said to the conductor, what do these people live on? "*Hog and hoecake*," said he, "year in and year out." And so it is too often in outlying farm districts; the delicacies of life are too few and infrequent.

What a world of comfort this would be if we only took God's gifts as freely as they are offered and here comes in the fruit garden. Farmers, let your tables overflow with luxuries of your own production. Start the boys in this work. Yes, the girls too. The young people will hold closer to the farm with such privileges than without. Health, comfort and good cheer will make you wiser, happier and better. By all means, then, improve to the utmost the home fruit garden.

The raspberry and blackberry; both these fruits are valuable. The land should be good and the culture good. The raspberry should stand in straight rows both ways, six feet by six feet. When the canes reach four feet, nip out the tips with thumb and finger; as the laterals extend eighteen inches, nip a clip again; cultivate both ways, tie to stakes, and you have a foundation for a large crop.

Varieties: Souhegan, Mammoth Cluster, Nemaha and Hilborn.

Blackberries, plant 8 feet by 6 feet, and treat much the same.

Varieties: Snyder, Taylor, Erie.

In closing let us remember in general that the culture of a highly manured plat costs no more than the same without manure. Also that clean culture can be secured as well under high fertilization as without.

Therefore let your work be complete, lacking nothing, and you may adopt the motto: "*Post prœlia, premia.*" (After the battle, the reward).

DISCUSSION.

Mr. POPE. I would like to ask Mr. Augur how the Shaffer succeeds with him, and whether he would recommend it for general cultivation.

Mr. AUGUR. It succeeds admirably with us. It is an immensely strong grower and stands perfectly well with us. I do not know whether it would be as hardy with you, but, if so, it is a most desirable variety. Under high culture you get a great many berries that will measure three quarters of an inch in diameter; and while the color is not quite perfect, yet the good size and the good canning quality of the fruit make it a most desirable variety to plant. Our canes sometimes grow as large as a walking stick and very strong. If the plants are set four feet apart in rich ground they will branch

out and bear an immense crop. The full name is "Shaffer's Colossal" but it is commonly called "the Shaffer."

Question. Will you name the varieties of the red raspberries that you would recommend?

Mr. AUGUR. I hardly dare do it, for fear I may lead you astray; your climate is so different from ours that the varieties that are hardy with us might fail with you. If any one has had experience here he would probably be a safer guide than I. If I were to name some for you, among the first I should put the Cuthbert, which is perfectly hardy with us, a good producer and the fruit is a good market berry. Take it all in all, no variety that we have had has been more generally approved than the Cuthbert.

Mr. BRIGGS. I would like to ask Mr. Augur if he considers the Sharpless strawberry a good shipping berry.

Mr. AUGUR. Yes, for short distances. I don't know as I ought to say yes, because shipping may mean five hundred miles. There is one fault about the Sharpless; it doesn't color all over at once; they have green tips, and sometimes, if we wait long enough for them to get a good full color they get a little over-ripe. If we pick them with the green tip it makes them look badly when they reach the market. If you wait until they are over-ripe before you pick them they are not good berries to ship.

Mr. BRIGGS. At the present time, near our small cities and larger villages, we are increasing the production of strawberries, and I noticed last season that the Sharpless were sought for at remunerative prices.

Mr. AUGUR. I should judge that among the larger berries that have been widely distributed and tested over the country, probably the Sharpless would take the lead. You allude to the Wilson. The Wilson strawberry is not understood. Like the Concord grape it colors before it is ripe. If picked at that time it is a sour berry and wants a great deal of sugar. But if you let the Wilson get thoroughly ripe it is of very good quality; but in that case it loses its shipping quality. The shipping quality of the Wilson is owing to the fact that it colors over before it is really ripe.

Mr. SWEETSER. I would like to ask with reference to the Jessie strawberry. We have a circular recommending it, and from what I have seen I have got an opinion that it is going to be a leading berry in some sections; I don't know how it will be here. The Belmont I

heard spoken of last year. I see that Henderson, in his "Gardening for Profit" speaks of the Jewell as being a wonderful berry.

Mr. AUGUR. With regard to the Jessie all I can say is that we think well of it. It comes from Wisconsin. We have not fruited it really enough to determine its value, but we have been favorably impressed with it, as we have with the Belmont. I feel a little delicacy in saying anything about the Jewell, because it would be like an interested witness testifying on the stand in his own behalf.

Sec. GILBERT. I trust you will smother all feelings of that kind, and we will forgive you as long as you keep truth on your side.

Mr. AUGUR. I am glad your secretary has given me that caution.

Mr. POPE. When he started from home his wife and son told him to be a little careful about what he said in regard to the Jewell, for fear he might appear to be blowing his own horn.

Mr. AUGUR. As a matter of caution you must consider whom it comes from and give no more weight to it than it deserves. I am going to tell the truth, as brother Gilbert has suggested, so far as I can, for two or three reasons. The old maxim is that honesty is the best policy; and, another thing, I should feel utterly discouraged with the task before me of cheating a crowd like this if I felt disposed to. I will say this, that on our grounds it has proved a great success, and, on the other hand—for I must tell both sides of the story—it has gone into some hands where it has been condemned. Mr. Green, of "Green's Fruit Grower" has condemned it pretty strongly, and he paid us in doing it a compliment, and perhaps thought that would shut our mouth. He said he believed that the man who supplied it was an honest man and didn't intend to wrong anybody, but nevertheless the variety had failed to satisfy the expectations of many who had purchased it. Well, I will not dispute it; it has disappointed some. I want to tell you a little about its peculiarities. It is especially a variety that does better in hill culture and on a deep, strong soil. If you have a sandy soil that is not very rich I would not advise you by any means to try the Jewell, because I should fear that you might be disappointed. At the same time we have had some excellent testimonials from people who have grown it on that kind of land. It has one fault if it be a fault; I don't know as it is; it is not a fault for us, and President Lyon of Michigan says it is not a fault for him; but many people regard it as a fault. It does not make plants rapidly. Under favorable circumstances it makes exceedingly heavy plants, but it does not make a great many, and I know many of our patrons complain about that.

They expected they were going to get a good many thousand plants and make considerable money out of it, and it does not meet their expectations in that direction. And just let me make a suggestion here. I would not advise anybody to buy largely of the Jewell or any other new variety until they have tried it in a small way. A dozen plants well taken care of will tell the story and tell it pretty soon. Whenever you have any variety of strawberry that multiplies slowly, and you regard it as a fault, suppose you have a dozen plants, you take your plants from those plants which make the greatest number of runners, use those for stock and let the others go to fruit, and keep repeating that year after year, and you will find that the capacity for multiplication will increase. We are doing that every year; for our stock plants we select from the best and from those which are the most prolific in runners. We have no fear about productiveness.

Just let me say here, as perhaps there have been various reports about it, that a few years ago we had a field day on our grounds, and on a piece of one twenty-second of an acre of strawberries that we set about the first of August, the number of quarts of berries exceeded the number of the plants. That is, we had more than one quart to a plant, some plants yielding two quarts and a little over. It takes fifteen thousand and some hundreds of plants to the acre, where they are set twenty inches apart each way. At a quart to a plant, if you can secure that, you have over 450 bushels to the acre. I do not say that you can secure that; it would be perhaps the exception; but I simply mention it to show that if you can reach the maximum you will obtain a large crop. There is one objection to the method of hill culture, and it is this: That when the grubs are numerous on a piece they dig and reduce your stock so rapidly as to be very discouraging, and we do not like to adopt that plan unless we are pretty sure of being free from the grub. And even then we have a bed alongside, where we have a reserve of plants, so that in case we lose one occasionally we supply its place at once, of course finding the grub and destroying him. It is always seen when we plant on new land, but when we plant on land that has been cultivated two years, we feel pretty confident of not being troubled very much with the grub.

Question. What do you think of fall planting as compared with spring planting of strawberries?

Mr. AUGUR. It depends very much on circumstances. On land that is suitable to fall planting it does very well. I should say summer planting would be better. If you plant in August the plant can so far develop and crowns form to such an extent that you get a heavy yield the next year. If you plant later than the first of September you will hardly do that. If I planted in October I should do with those plants the next year just as I would with spring set plants, cut off all the blows; because you would not in any case get any good crop, and all you would gain would be simply by doing work in the fall which otherwise would have to be done in the spring. If your ground is heavy, if it is cold and wet, I would hardly advise planting in October. If you can get a piece of land ready to plant anywhere from the middle of July to the first of August, plant in hills, keep the runners all cut, and then you may calculate on a heavy crop the next year.

Question. Would we also have a heavy crop the following year?

Mr. AUGUR. We do not try that; we do not like to use a spent cartridge, if I may use that expression. There is a great deal in that too. I know a very excellent man in our place, a minister; and he preaches well; he produces sermons more successfully than strawberries; but he advocated in the paper the planting of strawberries in the spring and raising a row of beans between. If beans bring a better price than strawberries I would plant the whole piece with beans, but if they do not I would not plant them at all. I believe a little with the apostle, "this one thing I do." I believe in making a specialty and then attaining as high results as possible. And so I do not believe in taking a second crop from the same plants. You can get a moderate crop; but in the mean time clover and weeds have come in, which necessitate a good deal of hard work; and we have always thought better to turn the plants right over and take a new piece, and then we get large berries. You may be sure it is worth something to put crates of berries into the market so choice that the dealer will put your name on them on a large placard, say, for instance, "White's berries," and have people going from one store to another inquiring for them. If you can get a reputation of that sort it is worth something. And if you raise a second crop on the same ground they wouldn't be apt to put your name on the berries.

Question. Is the Jewell a good shipping berry?

Mr. AUGUR. I am glad you asked that question. It is like the Wilson in one particular; it colors over at once usually, and when

it first colors it is of a scarlet color; and our experience is that if we pick it at that stage we can ship it almost anywhere. If it remains on a day or two longer it becomes crimson. In that stage it will go well to a near market. But if you let it remain on a little longer, until it becomes dead ripe, it becomes a very dark crimson, and then I should not want to ship it very far or have people keep it over night. I know one of our patrons made the mistake of letting his berries get too ripe. And, by the way, I think all strawberry growers will agree that this is wise: keep right up with the crop. If you let berries go until Monday or Tuesday that ought to be picked Friday or Saturday, you will have trouble with them. A great deal depends upon that. Pick them often enough so that they shall not be in the last stages of ripening. A large berry, when it gets over ripe is very apt to go down. We sell by wholesale entirely, and we have always said to our customers, "if you find it necessary at any time to charge back any berries that we send in, do so;" and last year and the year before, when we came to settle up accounts, we asked the men if there was anything to charge back and they said "nothing." We have taken the precaution to keep up with our crop in picking, even if we have to send some into the market when they do not bring quite as much. We do not like to leave berries Friday and Saturday to go over till Monday if they want picking then; and we have always picked on Saturday and put into a cold room, where the temperature is about fifty, and then they go in Monday morning in good condition. I know last season when a load of our berries were going to market in pretty good season one Monday morning, some of our good people asked each other, "when do you suppose those berries were picked?" but they were picked Saturday.

Mr. POPE. While you are up I would ask you to say a few words about the currants.

Mr. AUGUR. I think the currant is a very useful crop. It is a productive crop. There is more sugar in the currant than in the strawberry, though it is hard to believe it. We have about an acre and a quarter of currants and they do very well. It takes a smaller quantity of currants to satisfy the market, almost anywhere, than of strawberries. We can send in five crates of strawberries where we can one of currants. If anyone is inclined to plant white currants, as sometimes they are recommended very highly, I would say don't do it. We had a very large crop of white currants last year, and

if the crop, generally, had not been short we should have had difficulty in getting rid of them. You can sell five quarts of red currants where you can one of white, and we have to sacrifice on our white currants. It is the color that people want to buy; if they buy for jelly they want a brilliant jelly. We set about four feet apart one way and three the other. Growing in a pear orchard they do nicely, and so do the pears. For the currant worm, I would recommend hellebore in solution. Syringe or sprinkle the bushes early. Do not wait until the worms have half eaten off the foliage. It is very easy to keep them under control. If you take it in the first of the season and are right down thorough, going over the entire lot of bushes, and follow it up, you will find that it will be almost needless to do it the next year. Sometimes we pass over a year or two after a very thorough war against them, without seeing much of them. But, as a matter of precaution, we calculate to go over the bushes at least twice during the season. A great many plants will not have any on them; here and there there will be a bush that needs syringing pretty thoroughly. It is a good crop to raise to a certain extent, if you don't get the market overstocked.

Question. What is the best variety of currants.

Mr. AUGUR. Before having Fay's Prolific we had decided that the La Versaillaise was the best currant. There is not a great difference between that and the Cherry. We are inclined to put Fay's Prolific a little ahead. The Red Dutch is very productive, but the berry is smaller. The Victoria is rather too late. That is a point that any one planting for the market must look at. Late in the season, whether the currants are over-ripe or not, people are afraid of it. When currants get over-ripe they do not make jelly well and people are afraid of that.

Question. How much hellebore should be used to a gallon of water; and should the water be cold or hot?

Mr. AUGUR. A table-spoonful is sufficient. We do not heat the water. We mix it in thoroughly a little beforehand.

Mr. ATHERTON. Mr. Augur was particular to emphasize the matter of rotation in the planting of strawberries. I thought he was rather extreme. I know that that view, of one year being sufficient to run a strawberry plant, is carried out by those who cultivate the strawberry upon a large scale; but is that advisable always? It would seem as though that extreme doctrine might discourage some who wish to cultivate, not largely, but in a small way. In such

a case I would ask Mr. Augur if he would not advise running for two or three years, and could not some profit be got out of it in that way?

Mr. AUGUR. Well, that is a thing to be considered. In a private garden sometimes it may be desirable to let a strawberry bed go over the second year. Brother Atherton speaks of people being discouraged by the idea that only one crop can be taken off from a set of plants. But there is another view of it. I don't know of anything that encourages anybody more than a heavy crop, and if we find that we can get a heavier crop by shifting onto another piece of the garden and putting in something else where the strawberries were it seems to me that is encouraging. I may be extreme in my views, but one of the oldest strawberry growers in our State said to me, "people lose a great deal by undertaking to run a strawberry bed the second or third year," and I have come to believe it. At the same time I know that people do sometimes get a very fair crop the second year by a good deal of care. We have tried it, but we have found that it does not pay. On a piece of land that is very free from weeds and very easy of cultivation it might do.

Mr. ATHERTON. One thing more I would like to have you make a little plainer, and that is as to the application of manure the third year. The first year you plant corn with a certain amount of dressing; the second year potatoes with a certain amount of dressing, as a preparation of the soil for a strawberry bed. Then you plow the sub-soil and you apply twenty-five cords to the acre. Now I wish to know whether you would advocate plowing that way down deep into the sub-soil? Do you apply it before plowing or after?

Mr. AUGUR. We have applied before. In planting corn we always apply the manure to the surface and run the cultivator freely and think that is as profitable a way as any. But in the strawberry field we like to get a good deep soil and we run the sub-soil plow right following the surface plow, not turning the red or yellow dirt up to the surface, but simply loosening the soil.

EVENING.

The last session was largely attended by the public and much enjoyed. Secretary Gilbert presided. Mr. L. H. Blossom of Turner read a paper on

FRUITS FOR HOME USE.

By L. H. Blossom.

When I was called upon to write a paper on the above named subject, I suppose it would be expected to be both practical and useful. And I shall attempt to make it so to the best of my ability. Whether I succeed or not remains to be seen.

If, in my remarks I refer you to some of my own personal experiences in the culture of "small fruits," it will be only that I may make myself better understood in this way than in any other. Prior to this meeting, this subject has received very little attention from the hands of our pomological society. I think not near the attention that this important branch of horticulture should receive from the hands of our agricultural friends.

When we look around us and see how few of our farmers are supplied with these health-giving fruits found in a small fruit garden, it is, most certainly, time that something was said to interest the farmers of this State in this direction.

You go into our city markets in the time of small fruits, and you find our markets, flooded with the plum, grape, cherry, strawberry, raspberry and blackberry each in their season, are furnished by the small fruit market gardener, thus keeping our city cousins far better supplied than we whose table *should never* be without these luxuries.

You go into the country where it should be found in all its freshness and beauty, you note the change, not one in ten; no, I will put it stronger than that, not one in fifty have got a good, first class, well regulated "small fruit" garden for home use.

Now I write this from my own personal experiences and observations, not from any visionary point of observation. I don't want you to think that we have no "small fruits" up in my town for we have, and lots of them too, but while with one you find the plum, cherry and grape in almost the forty-nine other places you will find the strawberry, raspberry and blackberry a minus quantity. In such cases the strawberry bed is the mowing fields, from which the tired

house wife will try to cull from beneath the laughing butter cup, the nodding daisy, or the crinkled brake enough of those poor little insignificant wild strawberries to set on the table for her liege lord's supper. Or in raspberry or blackberry time you must hie to the back lot or the cut-down and stumble over rocks and stumps and climb through bush and bramble in your hurry-skurry to get back by tea time. Such I believe to be the present condition of things on most of the farms without the "small fruit" garden.

If on the other hand they would devote a little more time and a little more space on their farms for these best of health giving fruits and eat less of pork and beef, I believe the doctor would have to be called to visit the sick far less than now.

But some one said, "I can't afford the time to set out and tend a 'small fruit' garden." Well, let us see about that, first, how many plum trees shall we set and what varieties are the best? In reply I would say set two Lombard, two Imperial Gage, one Bradshaw, one Washington, enough for home use and some to give to your indolent neighbor. Six good cherry trees would help fill up the list. In grapes I would set the Brighton, the Warden, the Delaware and Concord; each in their time would furnish an abundant supply of that most excellent fruit. Next let us look to the strawberry bed. Of this delicious fruit I shall speak more fully. This is the most difficult of all the small fruits to raise, yet the best if it is rightly managed. For location I would select a good, strong, moist soil, well drained and enriched. I would set my strawberry bed on land that had been used for some hoed crop the year previous, bearing in mind that it must be kept free from weeds, and the next spring as early as possible I would set out the strawberry plants.

Now, for a list of strawberries. As far as my experience goes, I would select from the following list: Wilson's, Albany, Sharpless and Crescents, perhaps it would be better to substitute the Manchester in the place of the Sharpless for this reason, the berries are equally as large as the Sharpless, the Manchester grows on very strong stalks not very long, in consequence of which the berries are held up from the ground. While with the Sharpless they grow on long, weak stalks and are more apt to drop in the dirt and become unfit for table use.

Of course these varieties will vary according to soil and location. My bed is on a good strong muck soil well drained, it is the natural home of the strawberry, and well cared for a small patch will furnish an abundance of this luscious fruit for the home table. Perhaps just

a word in regard to my form of a strawberry bed would not be out of place at this time. I would plant two rows two feet apart, training the rows together or towards each other, then a walk of four feet, then two rows more in the same way as the first two and so on until you get all set that is wanted. This method gives the picker a chance to pick from the outside and inside and not get onto the vines and injure the berries when picking. After picking the second year I would train the runners into the path after giving the ground a liberal coat of dressing and in this way start a new bed; when well rooted dig up the old bed and then you have a new one started for next year. In this way you will always have plenty of strawberries with which to furnish your table.

For raspberries I would plant Turner and Cuthbert for reds, and for black caps, I would plant Tyler for early, Gregg for late. Now, if you set fifty plants of each, in two years you will have all the raspberries you can use in your family.

In regard to care and culture, the reds should be planted three by six feet apart, and the first year after planting you should allow no fruit to grow, but cut the plants back to within about a foot of the ground, the second summer and after, pinch off the end of the young shoots when about two feet high, but don't pinch but once in a season, the branches also should be kept pinched back to about a foot in length.

Don't allow more than eight or ten canes to grow in a hill. Every fall cut out the old canes. Under this treatment you will find no trouble in raising all the raspberries you want for your own needs.

With the black caps I have not had as good success as with the reds and I lay the fault to my not having pruned them enough. The black caps are propagated by means of the tops bending over and coming in contact with the ground when they take root. After becoming well rooted the stalk is cut off about a foot from the ground, thus you have new plants to set out.

But in case you don't want any new plants you must prune the same as in the reds to get the best results.

In the cultivation of the blackberry treat the same as the raspberries as far as pruning and cultivation are concerned, and your vines will afford you an abundance of fruit. For varieties, I would plant the Snyder and Agawam as they are all the varieties I have tested.

Now in conclusion, let me say just a word to you, it has not been my aim to paint you a picture beyond the reach of any of you. I have tried to make my paper so plain that every boy and girl here

to-night will know just how to go to work to make a small fruit garden.

And now boys and girls, when you go home to-night just you tell your parents you want some strawberries, raspberries and blackberries to set next spring, and a good chance to set them and plenty of time to tend and care for them, and don't you give them any peace till you get just what you want. Hoping and trusting that some where in these few hastily written words, I have said something that has been of interest to you, I will close.

DISCUSSION.

Sec. GILBERT. We still have with us our friend from Connecticut, who has not yet exhausted his store of information on the subject. And while, up to this time, we have been dictating to him something of what to say, we shall now be pleased to have him come forward and say some things that he thinks he ought to say to us and give us some information on those points on which he thinks we need it.

Mr. AUGUR. Mr. President, and Ladies and Gentlemen. I can not help thinking that the people of Maine ought to have this evening to themselves rather than to listen to me. However, as I am not very often here and I have been invited to occupy a few minutes, I will do so. With your permission I think I will say a few words on a matter that was alluded to and which I in part omitted this afternoon, namely, the matter of cross fertilization and hybridization.

The urgent need of new varieties of fruit combining the best qualities of our present successful varieties, and adding thereto some very desirable new points, is my excuse for offering a few thoughts thereon. For illustration, the Baldwin apple is one of the best shippers we have. It is also a very good apple for general use. Now what would we like to add to it to make it more valuable? First, a stronger constitution as a tree. Second, a disposition to bear annually and more evenly, instead of giving breaking crops one year, with barrenness the next. Third, an added richness in quality with a little more brilliancy of color. This is simply an illustration to show what is needed in all species of fruits. We have not yet attained to perfection in any. Now we readily understand that in order to gain a desired point in any direction we must make a direct move in that direction. If we could apply the subtle forces of nature as accurately as the expert billiard player does to his balls, the desired result would be easy to gain.

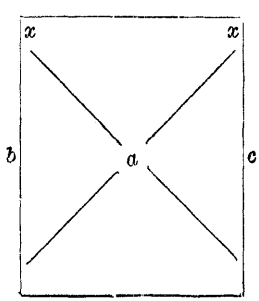
This we must admit is not the case; there are unseen and opposing forces; bad heredity, and the tendency to reversion confront us at every point. To illustrate: We have on our grounds a seedling crab we call the Middlesex; one of a lot of seedlings fr Yellow Siberian; but instead of taking the color of its parent, yellow, it diverged so widely as to be a dark red; this result may have been through natural cross impregnation; or a reversion toward more remote ancestry.

So in every attempt we make, no matter how carefully, we are liable to reach a result differing from our aim, simply through the laws of atavism, and reversion.

But we should not allow such a possibility discourage us, for we find that the momentum of high culture in connection with cross-impregnation, gives an impetus along the new line of work, promising grand results.

Again in aiming at high results I would advise when obtainable and as far as lies in the desired line, to use new varieties believing them to be more impressable than old ones. For instance we believe that varieties like the Jewell and Belmont crossed together and subjected to most favoring circumstances more likely to make an advance than old varieties, like the Hovey and Wilson, for a similar reason, to use an analogy, that when a foreign family immigrate the young members always get our language first, or that a puppy can be trained to do what an old dog cannot.

In raising new seedling strawberries we should take for the mother-plant a pistillate, having as they do a higher development of the female organs, place the plant under a small frame and as a pollenizer use the variety coming nearest to your ideas of a perfect berry. Thus, suppose you take the Crescent, the Jewell or the Gipsy, choose an ideal plant and use the Ontario, Jessie or Belmont as pollenizers. In this way let a represent the female and x the male plants.



When the blooming season occurs put a sash over the frames to prevent the access of foreign pollen and as soon as impregnation is complete remove the sash to afford air and water. It will be observed that if *a* is strictly pistillate, cross impregnation will be inevitable. Now, secure the highest development of the berries and choose the most perfect in size, form, color and quality for seed.

The plants from such seed will be a most interesting study. They may be expected to show wide and wonderful variations in habit of plant, flower and fruit with a possibility of valuable results. In case two bi-sexual varieties are used the mother plant *a* should, on the first opening of the flowers, have all the stamens removed with fine scissors to escape self-impregnation.

The same remark holds true regarding other fruits also where cross fertilizations are desired. And with grapes and tree fruits, a small sack of fine muslin should protect the flowers which have been castrated and the desired pollen from the chosen variety should be applied to the stigma of those flowers using a soft camel's-hair-brush or something of the kind.

This field is a wide and inviting one giving an opportunity of working out beneficent results. To those who are beginners in this work let me say, that a large amount of labor may be saved by an early rejection of worthless plants, vines or trees, where the foliage or wood show a reversion toward the wild type, the sooner they are uprooted the better.

Again, in judging of the merits of new fruits, what we want is not mediocrity but superiority; and as a rule no new fruit should be generally introduced unless it has points of superiority over varieties we already have; but we have not attained perfection in any one fruit as yet so the field is fairly open to any intelligent and judicious endeavor.

Let no one be discouraged at repeated failures, trial after trial may result in nothing of special value; but when a variety of real and decided value is obtained it is easy to multiply it indefinitely, and bless the world with it.

Therefore as a mark of good will, and as a pleasant recreation as well, we most cordially invite attention to this matter.

Remember the Concord grape, Bartlett pear, Baldwin apple and all other valuable fruits were new seedlings at first; other seedlings even better, may reasonably be expected as the result of intelligent, persevering effort.

Mr. POPE. The first question which I have been asked to propound for discussion is, what is the coming apple for shipment from Maine?

Mr. ATHERTON. I should say that in about five hundred and fifty years it might possibly be the Ben Davis.

Mr. TRUE. I have some thirty-five young trees of the Ben Davis. They bore some this year and the apples were some of the handsomest that I raised. The trees appear to be very hardy and to grow very rapidly. It seems to me that if we can grow a handsome apple with the keeping qualities of the Ben Davis we have got an apple that will bring us some money and that is what we are looking after.

Sec. GILBERT. The chair raises the question whether the extreme late keeping quality of fruit carries with it as much of money value as it did years ago; whether the demand for apples that keep extremely late, well down into the summer, is not passing away under the new order of things, and whether we might not conclude, therefore, that the quality of keeping extremely late would not give a great money value to the fruit.

Mr. MERRILL. I shipped some Ben Davis apples a year ago with my last shipment, and they arrived in much better condition than any other variety. I shipped as late as the fifth of May from Portland to Liverpool. I shipped thirty-eight barrels of the Ben Davis of my own raising on the twenty-ninth of April, and I shipped some on the week following. I saw them after they arrived and they looked just as well as when they came out of my cellar; and they sold better than any other variety at that time in that market. They do not claim that the Ben Davis there is as desirable fruit as some others, but they will pay a better price for fruit which is sound, than for that which is partly decayed. Late in the season the Baldwin matures very fast in transit, while the Ben Davis makes no perceptible change. The Russet looks very well after it arrives in Liverpool, but it is not the apple that it is when it leaves here, at that time of year, in April or May. As to the future of the Ben Davis we are unable to say, but we judge as to the profit of any business in the future from the past. We well know that the Ben Davis has been the best paying apple that we have raised when we have kept them late.

I know most everybody says the Ben Davis is worthless, but I notice our local trade is very good for that variety in May and June.

I am inclined to think the Ben Davis is about as good property as you can have for apples at the present time, either for export or for local trade.

Question. Another question was offered and stated by the chair as follows: The sum of the question is, how the Baldwin tree should be propagated, the question arising from the fact that the fruit growers generally concede that the Baldwin is not fully successful as grown in the nursery.

Mr. ATHERTON. Last summer, I called at Mr. George Bowman's place, of the firm of Bowman Brothers, in Sidney. He very kindly took me through his different orchards and nurseries. He had a number of rows of ingrafted Baldwin trees and they were very fine trees indeed. Some years before, I said, "Mr. Bowman, they say they cannot successfully raise Baldwin trees here in Maine," and I urged him to test the matter. And he put out in one year, I know, a thousand trees, and I think he has now about ten thousand, and I don't know but more, of young Baldwin trees, and he is ingrafting them every year, and he has a good many now, in his nursery of Baldwins ingrafted.

Mr. GILBERT. Mr. Bowman told me this winter while looking over his trees that he was not propagating Baldwins in the nursery.

Mr. BLOSSOM. This summer I had five barrels of Wealthies. All the fault I can find with the Wealthy is that it drops quite badly with me. That may not prove to be the case with others. It has borne well with me for the past two years and the apple is fine in every respect.

Sec. GILBERT. I think the falling off is a characteristic that holds good wherever it has been fruited in the State.

Mr. AUGUR. I think it should be borne in mind that the Wealthy is not a late keeping apple. In southern New England I think it is but little more than a fall apple or early winter, hardly keeping as long as the Hubbardston.

Sec. GILBERT. Allow me to add, in this connection, having had something of an opportunity for observation, and always keeping the matter in mind, that I think we can lay it down as a fact that has been proved, that the Wealthy in season is but very little, if any, later than the Fameuse, being here a November apple. Of course grown in the northern part of the State it becomes a winter apple.

I found them last fall all the way to New Sweden, these keeping well through the winter and promising to furnish to them a winter apple of high quality.

Mr. POPE. What encouragement have we for careful sorting of our fruit when all our buyers, in packing the fruit for the English market, pack the best ones on the top and bottom and throw almost anything in between?

Mr. PRINCE. I have been told that they pour the apples out into a large tray, a barrel or two, for a sample, and then sell from that sample. I don't know how that may be, but I have thought that if I had apples enough to make it an object, I would put up my apples and put my name in the barrels, and on the end I believe I should make money out of it. Put them up as they ought to be, and not as mine were this year—putting in about a peck of number ones on the bottom and then number twos, and marking them number twos. Of course when they open them they will think they have got a very fine barrel of number twos. I do not believe in that way of putting up apples.

Mr. POPE. I spoke to our buyer about that, and I said, "What is the use? As soon as they are turned out in the tray they show." He said, "Their first impression is the strongest; they see the barrel of apples looks very nice and they will pay a good price, even though they look badly down along. But if they open the barrel and it looks badly on top, that barrel is condemned any way." And I asked the same question in Boston, and they said, "You ship good hard apples, not very large, and don't be too particular about sorting; you will get more money out of it." In shipping I sent number ones and twos on the same vessel, sold at the same time, and I got more money out of the number twos than the number ones.

Mr. PRINCE. I guess it is time for me to take the train. [Laughter.]

Mr. BLOSSOM. Mr. Merrill told me how to pack them, "I want you to pack them right straight down through all just alike." Now what did he go over to England for if it wasn't to find out how he wanted these apples packed?

Mr. MERRILL. I should be glad to explain the process of selling apples there. I think the buying of apples and exporting is as legitimate a business as we have in the State of Maine and many of the apple growers appreciate it. Mr. Pope's apples go to Liver

pool and so do Mr. Princes'. Apples are sold in a good square legitimate way there; a poor lot put on the market is sold at a low price. They are able to see them. There is no sales-room that I ever saw in this country that is better fitted up to show goods than they have in Liverpool to show their apples. Their sales come on Mondays, Wednesdays and Fridays. The sales-room will probably hold three or four hundred people and is so constructed that one person can see the apples as well as another. The seats rise towards the rear like those in an opera house, only more rapidly. Suppose a man has a thousand barrels of apples on the dock, of ten different brands. If he chooses to sell them at ten different sales he will bring up two barrels of each brand to this building and they are set in an elevator and they are drawn up through the floor. One barrel is dumped out into a large basket where every one is able to see about every apple, and the other barrel sits on the elevator as it is headed up, to show the appearance of it on the market. There are five brokers in Liverpool and only five who do this business. There is no competition there; those five brokers are together; they stand up on a stage about ten feet above the floor, and each one has a clerk, one on the right and one on the left; and when the sale commences in the morning at 8 o'clock (which is 3 o'clock with us) each auctioneer is entitled to forty minutes; he commences his sale, and when the forty minutes are up he sits down and the next man takes the stand; and so they go through with the five, and then commence with number one again. Sometimes the sale continues all day. What are unsold are left until the next sale day, two days following. With the experience I have had in shipping apples, my opinion is that the man that packs his apples best gets the best prices.

The discussion closed the exercises of the joint winter meeting, which proved to be one of the most profitable meetings ever held under the auspices of the society.

THE SECRETARY'S PORTFOLIO,

CONTAINING

Original and Selected Scraps, Composed by Fruit Growers and others, and Gathered from Various Sources.

The Secretary's Portfolio.

The past year a large number of valuable papers and articles have been written by prominent horticulturists and others, bearing more or less directly upon the work of this Society. Thinking many of our Maine readers may not see them in other form, we have gathered the items for the following pages from various sources. We trust they may afford the readers as much pleasure as their preparation has given the Secretary.

THOUGHTS AND SUGGESTIONS ON FRUIT CULTURE IN MAINE.

By D. J. BRIGGS, South Turner.

First, is it profitable to cultivate fruit? Yes, it promotes the health of man or beasts to partake of fruit in more or less quantities during the entire year. Apples take the most prominent part in fruit growing in Maine although almost all farmers can propagate in this State other species of fruit, such as pears, plums, grapes, cherries, strawberries, raspberries, blackberries, &c. If any one has more than is needed for home use it will most always sell in our large towns and villages for a remunerative price. Apples are quite extensively exported at the present time and it is considered a good paying industry both for the grower and the shipper. I believe it pays as well or better than any other farming; and right here, would it not be well for this society to select a committee or otherwise to present a petition before our agricultural committee at the next legislature assembling for an increase of stipend; say ($500) five hundred dollars in addition to what we now receive? That would make one thousand dollars; that is a small outlay for the interest of fruit culture in proportion to legislative appropriations in many other States. Fruit farming is almost second in production financially in comparison with other farm products of this State. Sec. Gilbert's report on State stipend to the agricultural societies gives the three States, and thirty-six local societies a little short of eight thousand dollars. If equally divided it would amount to about two hundred dollars. The thirty-six local societies as reported receive nearly one hundred and fifty dollars each, if equally divided. The fruit growers of Maine should receive encouragement in proportion to other industries of the country.

I think it would be advantageous for the fruit growers of Maine to hold more than one meeting each year for comparing notes and the discussion of subjects pertaining to the best interests of fruit growing in Maine. We should post ourselves as far as possible in regard to the kinds of soil that different varieties of fruit are to be planted in. When we learn that, it will not be so hard to decide what varieties to order. Orchardists have planted in former years more varieties, or in part. than was for their interest financially, although it has given them a lesson of experience, so in the future they may select a few of the best thriving varieties in their particular locality.

ASA GRAY.

During the past year the death of no one has been more universally regretted than that of Prof. Asa Gray, the renowned botanist of Harvard College. Not alone are botanists indebted to him, but fruit growers and florists will always owe him a debt of gratitude, for the excellent works he has written and the valuable knowledge they contain. The following paragraphs are from *The School World*, and it is a pleasure to publish them as a tribute to his memory.

Dr. Asa Gray was of Scotch-Irish descent. He was born in Paris, Oneida County, N. Y., Nov. 10, 1810. His father was by occupation a tanner, and operated a tannery in this New York town. As a boy, Asa Gray is said to have been bright and lively, a great reader, and able to gratify his tastes in that line from the volumes of a circulating library, for which he was messenger. He read the Waverly Novels, Byron and Shakespeare, and these had very much to do with the development of the high literary taste shown by him later in life. At the age of eleven years, he entered an academy, where he spent several years till he began the study of medicine. When twenty-one years of age, he graduated from the Fairfield Medical College.

By chance when a boy, he read an article on botany in an encyclopedia, and his first ideas of botany seemed to have come from the reading of this. He was for a time under the instruction of Dr. John Torrey, from whom he received most valuable lessons in botany as well as an excellent training for all the phases of life. So great was his early love for the study of botany, that he did not long engage in the practice of medicine.

Dr. Gray, who was long associated with Agassiz, became Fisher professor of Natural History in Harvard in 1842. The science of botany was then in very much the same condition as Agassiz found that of zoology, though if anything, less was really known of it. North America, with its varied climatic conditions, was an excellent field for botanical study. The work had hardly more than begun when Dr. Gray went to Harvard. He was a patient observer, as well as a good systematizer. He was able to interpret plant life and translate it into language comprehensible to the school boy as well as the college professor. The "Flora of North America" soon grew out of his labors and at once became the standard of all the botanists in this country, as it is to-day. The systematic "Herbarium"

erected at Harvard under the direction of Dr. Gray, within whose walls are arranged and classed thousands of botanical specimens from all parts of the world, is a veritable Mecca for American botanists, as well as for naturalists from every civilized country. The Harvard Botanical Gardens are also visited by thousands of students, and others who love the flowers for their beauty alone. Dr. Gray planned the gardens himself, and to them devoted much thought. As a medium of instruction, the gardens have ever proved an invaluable factor in the college course of study.

He continued his labors as instructor till 1873, since which time he has had the charge of the herbarium, and has devoted himself to its arrangement and to botanical studies. In the midst of these duties he was called to his rest. He died in Cambridge January 30, 1888.

The results of Prof. Gray's labors are shown in the numerous text-books and papers on botany written by him. The "Flora of North America" is the work of a lifetime, but his numerous text-books are equally valuable, for as text-books they may safely be regarded as superior to all others upon the same subject. Among these text-books we find "How Plants Grow," "How Plants Behave," "Lessons in Botany," "Manual of Botany," and others. Some of these are beautifully written, and so free from technical terms that they are read by children with great pleasure. Men of high attainments in knowledge are said to be unable to write things easily understood by children, but Prof. Gray is a very notable exception to this rule.

FLORICULTURE IN THE UNITED STATES.

No longer than thirty years ago it was rare to find any other than a foreigner engaged in commercial floriculture. These men had usually been private gardeners, who were mostly uneducated, and without business habits. But to-day the men of this calling compare favorably in intelligence and business capacity with any mercantile class.

Floriculture has attained such importance that it has taken its place as a regular branch of study in some of our agricultural colleges. Of late years, too, scores of young men in all parts of the country have been apprenticing themselves to the large establishments near the cities, and already some of these have achieved a high standing; for the training so received by a lad from sixteen to twenty, better fits him for the business here than ten years of

European experience, because much of what is learned there would prove worse than useless here. The English or German florist has here to contend with unfamiliar conditions of climate and a manner of doing business that is novel to him. Again he has been trained to more deliberate methods of working, and when I told the story a few years ago of a workman who had potted 10,000 cuttings in two inch pots in ten consecutive hours, it was stigmatized in nearly every horticultural magazine in Europe as a piece of American bragging. As a matter of fact this same workman, two years later, potted 11,500 plants in ten hours, and since then several other workmen have potted plants at the rate of a thousand per hour all day long.

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But beneath these flitting fancies is the substantial and unchanging love of flowers that seems to be an original instinct in man, and one that grows in strength with growing refinement. Fashion may now and again condemn one flower or another, but the fashion of neglecting flowers altogether will never prevail, and we may safely look forward in the expectation of an ever increasing interest and demand, steady improvement in methods of cultivation, and to new and attractive developments in form, color and fragrance.—*Peter Henderson, in Garden and Forest.*

SPRAYING WITH ARSENICAL POISONS.

As to the use of Paris green, it is only twenty-two per cent arsenic; it is insoluble in water and soon sinks to the bottom. Arsenic is all that does any good. As it is the arsenic that is effective, what is the use of using anything else than arsenic, which costs only a few cents per pound. In quantities it can be bought for six, five, even three cents per pound. In California they use one pound to four hundred gallons of water. They say there is no advantage in a strong solution. A week solution does not injure the foliage of the trees. Even one-half pound of the white arsenic to four hundred gallons of water would be effective. Let us make a perfect solution. Alkali will make arsenic completely soluble in water. Use one pound can of concentrated lye to four hundred gallons of water. One ounce of arsenic to a fifty gallon barrel of water—the expense is really nothing. Dissolve the lye in the water first. There is no chemical change in the arsenic. Dissolve the lye in cold

water. The only reason for using Paris green or London purple, instead of the white arsenic, is that they make a colored solution and lessen the danger of poisoning. Label your bottles of arsenic and the barrel in which you make the solution. Never handle poison without a label.

A pint of the water would contain one and one-fourth grains of arsenic. One-half a grain would be injurious. Keep everything labeled. It will not poison the skin, even if broken, in such a weak solution. There is no question that it kills the codling moth. We must spray about the last of May when the apples are the size of peas. The first brood is then on the fruit. Some one asks, "Would not killing the first brood stop the second?" No, *sir*. The moth is capable of long flight; your neighbors will breed it for you; you must take care of your own orchard. If you will spray the last week in May, the last week in June, the last week in July and the last week in August, you will have a crop of perfectly sound apples. The first moths lay their eggs just after the apples is out of bloom, but they do not all hatch out in a day; it takes nearly a month for all of them to hatch, the first brood lapping over on to the second; the second on the third, etc. You spray every four weeks and you will get all of the broods. Don't spray early fruit when it is nearly ripe. It was said when the spraying remedy was first discovered, that once or twice would be sufficient, but it is found better to spray four times in a year.

Now, the question arises, is there any danger of poisoning from the arsenic left upon the fruit, or taken in through the skin? In California they have no rain in the summer; we have rains to wash it off. One-half pound of arsenic to four hundred gallons of water is seven and one-half grains to the gallon. Allow two gallons to large trees, say twenty grains to the tree. Now, is it not a very reasonable estimate to say that nine-tenths of the spray falls upon the foliage and only one-tenth upon the fruit—two grains to a large tree. Say this tree has two grains, the first rain would wash nearly all of it away. At the time of gathering there would not be over two-tenths of a grain to ten bushels of apples. A man would have to eat five bushels of apples at one time to be in any danger! So, you see, the risk of poisoning is infinitesimal. When you pare the apples and cook them the danger is nothing. Four or five rains would wipe out every vestige of the arsenic.—*Dr. Goslin in Report of Mo. State Horticultural Society.*

ARSENICAL POISONS IN THE ORCHARD.

As is well known, about fifty per cent of the possible apple crop in the Western States is sacrificed each year to the codling moth, except in sections where orchardists combine to apply bands of straw around the trunks. But as is equally well known this is rather a troublesome remedy. At all events, in Illinois, Professor Forbes, in a bulletin lately issued from the office of the State Entomologist of Illinois, claims that the farmers of that State suffer an annual loss from the attacks of this single kind of insect of some two and three-quarters millions of dollars.

As the result of two years' experiments in spraying the trees with a solution of Paris green, only once or twice in early spring, before the young apples had drooped upon their stems, there was a saving of about seventy-five per cent of the apples.

The Paris green mixture consisted of three-fourths of an ounce of the powder by weight, of a strength to contain 15.4 per cent of metallic arsenic, simply stirred up in two and a half gallons of water. The tree was thoroughly sprayed with a hand force-pump, and with the deflector spray and solid jet-hose nozzle, manufactured in Lowell, Mass. The fluid was thrown in a fine mist-like spray, applied until the leaves began to drip.

The trees were sprayed in May and early in June while the apples were still very small. It seems to be of little use to employ this remedy later in the season, when later broods of the moth appear, since the poison takes effect only in case it reaches the surface of the apple between the lobes of the calyx, and it can only reach this place when the apple is very small and stands upright on its stem. It should be added that spraying "after the apples have begun to hang downward is unquestionably dangerous," since even heavy winds and violent rains are not sufficient to remove the poison from the fruit at this season.

At the New York Experimental Station last year a certain number of trees were sprayed three times with Paris green with the result that sixty-nine per cent of the apples were saved.

It also seems that last year about half the damage that might have been done by the plum weevil or curculio was prevented by the use of Paris green, which should be sprayed on the trees both early in the season, while the fruit is small, as well as later.

The cost of this Paris green application, when made on a large scale, with suitable apparatus, only once or twice a year, must, says Mr. Forbes, fall below an average of ten cents a tree.

The use of solutions of Paris green or of London purple in water, applied by spraying machines such as were invented and described in the reports of the national department of agriculture by the United States Entomologist and his assistants, have effected a revolution in remedies against orchard and forest insects. We expect to see them in careful hands, tried with equal success in shrubberies, lawns and flower gardens.—*A. S. Packard, Garden and Forest.*

FIGHTING APPLE WORMS.

Prof. S. A. Forbes delivered an address giving results of an elaborate series of experiments upon the effect of spraying apple trees with Paris green for the codling moth, which was illustrated by a series of colored diagrams showing graphically the results obtained. The conclusion, as given by Prof. Forbes, was this: That at least seventy per cent of the loss commonly suffered by fruit growers from the ravages of the codling moth can be prevented by thoroughly applying Paris green in a spray with water, once or twice in early spring, as soon as the fruit is fairly set, and not later than the time when the young apple turns downward on its stem. On motion of Mr. Augustine a vote of thanks was tendered the Professor for the careful work being done by him, and many members said they were going to spray their orchards.—*Prairie Farmer.*

Great care is necessary in the use of Paris green for the destruction of the codling worm. Prof. Braun in his paper at our winter meeting gave the direction for using it at the rate of a teaspoonful to the gallon of water. If the Paris green is pure this will be too strong and will seriously injure the foliage of the tree. One-half the quantity of the poison will make the liquid strong enough, and even then will sometimes injure the leaves. We give this subject prominence here as its use is increasing very largely in the State.

AN ARBOR DAY EXERCISE FOR SCHOOLS.

The department of Botany and Forestry, of the Agricultural College of Michigan, issued the past spring. "Hints for Arbor Day." It contains valuable suggestions for the observance of Arbor Day

by schools and granges. As many of our people are becoming interested in Arbor Day, the following gathered mostly from the bulletin above mentioned is published and respectfully dedicated to the schools and granges in Maine.

Let each pupil represent a tree in this convention. In case there are not pupils enough to do this, some of the older ones may act as speakers for two trees. It adds very much to the interest if each pupil can have the name of the tree he represents clearly printed and fastened to the clothing so as to be plainly seen. The pupils speaking for the evergreens could wear a sprig for identification. If the pupils sing readily more pieces can be selected by the teacher.

White Pine. Fellow trees of Maine, we have met at this time for the purpose of holding counsel together. The woodman's axe has nearly driven me from the forests, and my neighbors as well as myself are becoming alarmed at the situation. We have met here to learn the value we are to the world, and to take such action as may seem necessary to secure our protection and appreciation among men.

I will call upon Black Spruce to preside over this meeting. As many of you as are in favor of making Black Spruce chairman of this meeting will please say aye.

All. Aye.

White Pine. It is a unanimous vote, and Black Spruce will please to take the chair.

The Chairman. Fellow trees, I thank you for the honor you have conferred upon me, and will serve you to the best of my ability.

The object of this meeting is to consider whatever may be of interest to the trees and forests of Maine. For many years mankind have sought us from the forests and converted our trunks into lumber and fuel, while man and beast have enjoyed the shade we have offered them. The object of this meeting is of great importance to us all and we hope to gain much information and to hear from every one present. We have gathered from all parts of the State for this conference. As we should keep a permanent record of our proceedings, and as the newspapers will probably wish to publish our papers and discussions, I think a secretary will be needed to take the minutes of this meeting.

Beech. I nominate White Ash for secretary.

White Birch. I second the nomination.

Chairman. All in favor of this nomination will please say aye. Those who are apposed no.

All. Aye.

Chairman. The ayes have it, and White Ash is elected secretary. (She takes her place at a desk or table near the chairman.)

Chairman. Our musician, White Pine, has kindly arranged the music for us. She sings only when the spirits move her. We may know when that is by the peculiar swaying of her head. At the swaying let us suspend business and listen. She moves—we will hear.

UNDER THE GREENWOOD TREE.

Under the greenwood tree
Who loves to lie with me,
And tune his merry note
Unto the sweet bird's throat,
Come hither, come hither,
Here shall he see
No enemy,
But winter and rough weather.

Who doth ambition shun,
And loves to live i' the sun,
Seeking the food he eats,
And pleased with what he gets,
Come hither, come hither,
Here shall he see
No enemy,
But winter and rough weather.

The Chairman. We are now ready for discussion. (Several trees rising at once.)

The Chairman. White Oak has the floor.

White Oak. I am found in the southern and western counties of the State. My wood is valuable for making handles for tools, and for finishing the interior of houses. As a shade tree I am not admired as much as I ought to be, for my foliage is beautiful and the children are fond of the nuts I bear. The Oak family is a large one and several of its members are found in Maine.

Beech. Upon my smooth, gray bark, many a heart history has been carved. The poet Campbell tells it so beautifully.

"Thrice twenty summers have I stood,
Since youthful lovers in my shade,
Their vows of truth and rapture paid.
And, on my trunk's surviving frame,
Carved many a long forgotten name."

And here is another beautiful thing from Whittier:

"I have always admired the taste of the Indians around Sebago Lake, who, when their chief died, dug around the beech tree, swaying it down, and placed his body in the rent, and then let the noble tree fall back into its original place, a green and beautiful monument for a son of the forest."

I am found in all parts of Maine and am one of the best known.

Norway Pine. The famous A. J. Downing said: "There are no grander or more superb trees than our American oak. We are fully disposed to concede it the first rank among the denizens of the forest. As an ornamental object we consider the oak the most varied in expression, the most beautiful, grand, majestic and picturesque of all deciduous trees."

Red Oak. Poetry, history, mythology and romance abound in references to the oak. I should like to hear from our fellow trees some common quotations in reference to the oak.

White Ash. "The unwedgable and gnarled oak."

Black Ash. "The old oaken bucket."

Sugar Maple. "Jove's own tree that holds the woods in awful sovereignty."

Red Maple. "A goodly oak, whose boughs were mass'd with age."

Hemlock. "King of the woods."

Black Spruce. "Thy guardian oaks, my country, are thy boast."

Silver Maple. "The monarch oak, the patriarch of trees."

White Elm. "The oak for grandeur, strength and noble size, excels all trees that in the forest grow."

Hornbeam. "Tall oaks from little acorns grow."

Bass Wood.

"Woodman, forbear thy stroke!
Cut not its earth-bound ties;
Oh, spare that aged oak,
Now towering to the skies!"

White Birch.

"Behold yon oak,
How stern he frowns."

Hackmatack.

"Proud monarch of the forest!
That once a sapling bough,
Didst quail far more at evening's wrath
Than at the tempest now,
Strange scenes have passed, long ages roll'd
Since first upon thy stem,
Then weak as osier twig, spring set
Her leafy diadem."

Red Oak. I begin to feel my pride rising, and I hope, Mr. Chairman, you will give me a chance to recite a poem written in honor of our family.

The Chairman. We shall be glad to hear it.

Red Oak.

"A glorious tree is the old gray oak;
He has stood for a thousand years—
Has stood and frowned
On the trees around,
Like a king among his peers;
As 'round their king they stand, so now,
When the flowers their pale leaves fold,
The tall trees around him stand, arrayed
In their robes of purple and gold.

"He has stood like a tower,
And dared the winds to battle,
He has heard the hail,
As from plates of mail
From his own limbs shaken, rattle;
He has tossed them about, and shorn their tops,
When the storm has roused his might,
Of the forest trees, as a strong man doth
The heads of his foes in fight."

Black Spruce. This beautiful poem recited by Red Oak reminds me of an old saying of Dr. Holmes: He says. "I wonder if you ever thought of a single mark of supremacy which distinguishes this tree from those around it? The others shirk the work of resisting gravity, the Oak defies it. It chooses the horizontal direction for its limbs so that their whole weight may tell, and then stretches them out 50 or 60 feet so that the strain may be mighty enough to be worth resisting. You will find that in passing from the extreme downward droop of the branches of the weeping willow to the extreme upward inclination of those of the poplars, they sweep nearly half a circle. At 90 degrees the oak stops short; to slant upward another degree would mark infirmity of purpose, to bend downward weakness of organization."

Poplar. This sounds scientific. I want to tell you something that begins with "Once upon a time." Once upon a time the devil agreed with a man that he should have the latter's soul at the time when the oak leaves fell; but when he came to look at the oak in the autumn he found it still in leaf, nor did it part with its old leaves till the new ones began to sprout. In his rage and disappointment

he scratched the leaves so vehemently that they have been in consequence jagged ever since.

Chairman. These are good words for the Oak family. We will next listen to some music from the little birds—our very dear friends.

Chairman. We shall next hear from the Maples, one of our largest families.

Sugar Maple. I am a favorite ornamental tree. Poets of all ages have sung about the oak. I am no sweet singer of Maine, but I am possessed of sweetness. I claim to have made more boys and girls happy than any other tree. I have many changes in dress—wearing in spring the softest shade of every color, in summer the purest emerald, and in the autumn the most brilliant yellow. My wood is used for furniture, floors, and for finishing the interior of houses, and after the houses are finished few can warm them better than I.

Red Maple. I am often called Soft Maple, a name also applied to one of my sisters. I beautify the country in spring with early red blossoms, and in autumn my leaves are streaked with scarlet.

Silver Maple. My sister, Red Maple and myself are both called Soft Maple. I make a very rapid growth and am found by the side of streams. I am often planted as a shade tree, and in the far West many are planted for shelter-belts and for timber.

Bass Wood. I am a fine shade tree, my home a moist rich soil. My fragrant flowers furnish a great amount of excellent honey for the bees at a time when most other flowers have disappeared. My timber is soft, light and tough, and not apt to split, good for cabinet work, boxes, finishing, etc.

The Chairman. We will sing.

"LOVELY MAY."

Lovely May, lovely May,
Decks the world with blossoms gay;
"Come ye all, come ye all,"
Thus the flowers call.
Sparkles now the sunny dale,
Fragrant is the flowry vale;
Song of bird, song of bird,
In the grove is heard.

Lightly pass, lightly pass,
Thus the nodding meadow grass,
Woodlands bright, woodlands bright,
Make from winters night—
Where the silver brooklet flows—
Rippling softly as it goes,
Will we rest, will we rest,
In green mossy nest.

Chairman. We will next hear from the Ashes.

White Ash. I am a tall tree and have often been complimented for my usefulness. I have been told that I have a graceful top and beautiful pinnate leaves. My wood is heavy, hard, strong, coarse-grained, compact, and of a brown color, and is much used for cabinet ware, farm implements, and house finishing. I thrive in rich, moist soil.

Brown Ash. I thrive in swamps and along streams, and become a large tree. My wood is used for furniture, barrel-hoops, and baskets. When well cared for, I become one of the finest ornamental trees. For this purpose I have never been fully appreciated. The Ashes belong to the Olive family. We have been called musical, as in this quotation:

"Ye Ashes wild resounding o'er the steep,
Delicious is your music to the soul."

Chairman. Who will speak next? (a number rise.) Birch has the floor.

White Birch. I am a useful factor in the cause of education, though not now so commonly found in the school room as in former years. There are several of us Birches in Maine. The Alders are our cousins. Probably you are best acquainted with the Canoe Birch, whose white wood you see in spools and shoe pegs. It gives up its beautiful white dress without any injury to itself. Longfellow has made us a celebrated family in Hiawatha. He says of us:

"Give me of your bark, O, Birch tree!
Of your yellow bark, O, Birch tree!
Growing by the rushing river,
Tall and stately in the valley!
I a light canoe will build me,
That shall float upon the river,
Like a yellow leaf in autumn,
Like a yellow water-lily!
Lay aside your cloak O, Birch tree.
Lay aside your white skin wrapper,
For the summer time is coming,
And the sun is warm in heaven,
And you need no white skin wrapper."

Chairman. Now let us hear from White Elm.

White Elm. I have been called queen of the forest, and stand without a rival at the head of the list of ornamental deciduous leaved trees. I claim this rank on account of hardiness, rapid growth, and the graceful and majestic beauty of my drooping branches. We are very proud of our Massachusetts relative under whose venerable shade Washington first took command of the Continental army, July 3, 1775. How the affection of every lover of his country clings around that tree! What care has been taken of it, what marks of esteem have been shown it by the citizens of Cambridge, may be judged by those who have seen it standing, as it does, in the centre of a great public thoroughfare, its trunk protected by an iron fence from injury by passing vehicles, which for more than a century have turned out in deference to this monarch of the Revolution.

Chairman. Let us all repeat the lines of N. S. Dodge in praise of the queen of the forest.

"Then hail to the Elm! the green-topped Elm,
And long may his branches wave,
For a relic is he, the gnarled old tree,
Of the times of the good and brave—"

Chairman. Let us hear from White Pine now.

White Pine. I am one of the tallest and largest trees in Maine, or rather I was in the past. The lumbermen have cut down the larger part of the old pine trees, but the State of Maine is called the "Pine Tree State" in honor of my importance in the past. In Europe, where some of my number have been introduced, they often call me Weymouth Pine. My leaves are long, light green and in clusters of five. As a long-lived and beautiful tree for ornamenting rural grounds and parks, I take a high rank, while an immense amount of valuable lumber is cut from my wood.

Chairman. We have another cone-bearing tree in attendance. I call on Hemlock.

Hemlock. I have been called by students in art and botany and horticulture "the most beautiful coniferous hardy tree yet known." I grow to a good height and acquire a large size. My evergreen leaves have delicate tints, my young branches droop gracefully. As a timber tree I do not claim the highest honor. My bark is valuable for tanning leather.

Chairman. Black Spruce is a sister, and we must listen to her.

Black Spruce. I abound in the forests of Maine. The boys and girls have always searched my trunk for gum, but not all the gum

you find in the market is real spruce gum. I am the most important lumber tree in Maine. Hundreds of lumbermen go into the woods in winter, cut down the spruce trees, haul them to the water, and then, when the snow melts away, float them down to the saw mills, where they are sawed into timber, boards, clapboards, &c. Within a few years my wood has been largely used in the manufacture of white paper.

Chairman. Basswood has promised to tell us something about the way in which the trees are planted.

Basswood. The squirrels eat many nuts, but carry a portion to some distance in every direction, when they plant one or two in a place. It may be the thought of the squirrel to return at some future time of need, but his bump of locality is not well developed, or he has laid up more than he needed. At all events some of the nuts are allowed to remain where he planted them. In this way he is a benefit to the trees, and pays for the nuts which he eats. He has not lived in vain, for he is a tree-planter and believes in arboriculture. His arbor days come in autumn, and he needs no gubernatorial message to stimulate his work.

Poplar. Many of our trees and shrubs produce a fleshy fruit or berry. Among them are the mountain ash, service berry, cherry and others. Many of these, when ripe, are rendered conspicuous by brilliant colors. The fruits are eagerly sought by the partridge, deer, bears, other animals and the birds. In most cases the seeds of such fruits are protected by a very fine covering, and are not digestible. They are sown broadcast by wild animals, under circumstances most favorable for germination. The birds, too, belong to the society of tree planters.

Chairman. Many of the trees in the forest bear small winged seeds, and others bear tufted seeds; these are borne away by the winds till they finally come to the ground, where they will sprout and grow if left alone. Will Red Maple tell us how trees should be transplanted?

Red Maple. In taking up a tree, whether large or small, do not twist it about so as to break or bend the roots abruptly. Get all the roots you can afford to, remembering that a tree will not grow without roots.

When out of the ground keep the roots constantly covered with soil, moss, damp straw or something else. The roots are far more sensitive to dry air than are the parts above the ground. No one

need wonder that trees carted into town with short roots exposed to dry air, often fail to grow or lead a precarious life for years. Study the structure and the physiology of a tree and treat it as one who always makes everything thrive which he cares for.

Chairman. How shall we care for the trees after planting?

Apple Tree. To set a tree so as to ensure its thrifty growth, place it but little deeper than it was while growing. Have the soil well pulverized and pack it closely about the tree.

After all this trouble, do not court disappointment in the slow growth or in the death of a favorite tree, but dig or rake the ground every week or two, all summer for three to five years for a distance of four feet or more each way from the tree. If this is impracticable, place a mulch of something covering the space above mentioned.

Chairman. After planting, trees sometimes becomes too thick. What shall we do?

Pear Tree. A tree, like a child, is a living, organized being and keeps changing as long as life lasts. It is not best merely to set as many trees as we expect to remain for a life time, but plant them more thickly with a view to removal. Here is where 99 out of 100 fail. They do not keep an eye on the growth and trim or remove trees until they have crowded and damaged each other beyond recovery. In most instances, a few large, well developed trees should grow where many small ones were planted years before. It needs courage and judgment to remove some favorite trees that others may continue to spread and make a symmetrical growth.

Chairman. Next will follow something in reference to the flowers of trees.

Wild Cherry. With rare exceptions, our trees bear flowers which are inconspicuous. The elms and the maples produce flowers in spring before the leaves appear. Most have the staminate and pistillate flowers on different parts of the tree or on different trees. The wind or gravity carries the pollen to the pistil, so there is no need of sweet ordors or a gay display of flowers to attract bees and butterflies and moths to carry the pollen. Compensation is well displayed in nature. If the tree has not gorgeous or fragrant flowers, it has a large size and often a beautiful form.

Chairman. We should learn to love trees and to associate them with the generous hand who planted and cared for them.

Mountain Ash. I will tell you something which was written by Washington Irving: "There is something noble, simple and pure in

a taste for trees. It argues, I think, a sweet and generous nature to have this strong relish for the beauties of vegetation, and this friendship for the hardy and glorious sons of the forest. There is a grandeur of thought connected with this part of rural economy. It is worthy of liberal, free-born, and aspiring men. He who plants an oak looks forward to future ages, and plants for posterity. Nothing can be less selfish than this. He cannot expect to sit in its shade nor enjoy its shelter; but he exults in the idea that the acorn which he has buried in the earth shall grow up into a lofty pile, and shall keep on flourishing and increasing and benefiting mankind long after he shall have ceased to tread his paternal fields."

Chairman. We will hear what O. W. Holmes says on this subject.

White Elm. Dr. O. W. Holmes says: "I have written many verses, but the best poems I have produced are the trees I planted on the hillside which overlooks the broad meadows, scalloped and rounded at their edges by loops of the sinuous Housatonic. Nature finds rhymes for them in the recurring measures of the seasons. Winter strips them of their ornaments and gives them, as it were, in prose translation, and summer reclothes them in all the splendid phrases of their leafy language.

"What are these maples and beeches and birches but odes and idyls and madrigals? What are these pines and firs and spruces but holy rhymes, too solemn for the many hued raiment of their gay deciduous neighbors?

"As you drop the seed, as you plant the sapling, your left hand hardly knows what your right hand is doing. But nature knows, and in due time the power that sees and works in secret will reward you openly."

Chairman. This concludes what we had on the program for this convention.

Hemlock. I move we have some more music and then adjourn.

Chairman. If there be no objections we shall have the music.

Chairman. This convention stands adjourned until again convened by the proper authorities.

HOW THE STATE AGRICULTURAL SOCIETY OBSERVED ARBOR DAY.

In reply to a letter of inquiry addressed to Hon. Rufus Prince, President of the Maine State Agricultural Society, we copy the following which shows a zeal worthy the imitation of others in Maine:

SOUTH TURNER, June 4, 1888.

BRO. KNOWLTON: Yours at hand. I have been intending to publish a list of the donors of trees which we have set on the State Fair Park. My call was quite liberally responded to. We have set one hundred forty-five maple and elm trees in different places on the park, and I feel proud of having inaugurated the move and believe it will result in making a great addition to the beauty of the place.

Very truly,

RUFUS PRINCE.

APPLES WITHOUT SUGAR.

A family known to us, who at one time thought cooked apples hardly eatable unless sweetened or spiced, or both, were persuaded this winter to try them baked in the skins, and without introduction of sugar or any other foreign element which makes the fruit chemically quite different from the perfect condition in which nature left it. The consequence is, they have come to prefer the new way, and proved that its nutrient and hygienic effects are much more marked and satisfactory. Now we find a well-known English horticulturist expressing himself at considerable length to the same purpose on the leading page of "*The London Garden:*"

"The sugar we add to apples only robs them of their specific and delicate aroma, reduces their quality, and renders them insipid and commonplace. For example, cook a Beaufin or a French Crab in sugar, and you have a pulpy mass, or pieces of colored matter that may be apple, rhubarb or Swede turnip, as the eater may fancy. But cook a Ribston, Blenheim, Cox's Orange, or Newton Pippin, or even King of the Pippins or Cockle Pippin, and each will be found not only most agreeably sweet, but so specifically distinct as to form a different dish. The finest apples for cooking are, without doubt, the Ribston and the Newton Pippins at their best, and both are not only greatly deteriorated, but half-spoilt in flavor by any additions of foreign sugar. I have long held the opinion that the best eating

apples are also the best cooking ones. Convenience, the possession of kitchen varieties, and the perversity of cooks in heavily dredging all apples with sugar frequently overthrow one's convictions, and go far to ruin the best apple pies and puddings. As a fact, the popular custom of adding paste and sugar to most cooked apples is largely responsible for the loss of most of their richest and most delicate aroma, as well as the source of their unwholesomeness to so many consumers. Butter, batter, drippings, and sugars of the rankest, roughest character, but little superior to molasses—why should these be allowed to destroy all the most delicate and delicious flavors of our choicest apples? No; if we wish to enjoy the latter in perfection let us either roast them in their skins, or skin and core and place in a pipkin, as you did the Newton Pippins, and enjoy a feast of apples pure and simple, and free from the suspicion of paste, treacle and fat."

The writer mentions a lady of refined taste who was so determined to have apple in purity that she would seldom eat one except when roasted or baked entire;

"Beginning with the old Keswick Codlin, she went on to the New Hawthornden, Cellini, Alexander, King of the Pippins, Cox's Orange Pippin, Ribston, Calville Blanche, and wound up with Court Pendu Plat. All were enjoyed in their season, but the feast of aromatic pleasure culminated in the Calville Blanche grown on the bottom of peach walls. The rule for all was little or no sugar, and that paste ruined the flavor of apples."

Finally, heads of families are advised against providing sweets to be added to this king of fruits, a precaution which would have the double benefit of "opening the eyes of the people to the enormous consumption of sugar in reducing all apples to a sort of dead level of mediocrity—the most wholesale deterioration and destruction of flavor;" and, in the end, promote the growth of only the best varieties, regardless of the present absurd market preference for bright color of skin.—*N. Y. Tribune.*

RED RASPBERRY CULTURE.

Favorable soil and climate aside, the principal requisites for success in profitable red raspberry culture are a good market at no great distance, and a good supply of pickers in the neighborhood. It is a fruit that does not stand shipping well, being apt to become mushy, which renders it unsalable.

A gravelly soil, inclining to sand, is the best for this crop, although it can be grown successfully in most any soil, except a stiff clay, if it be thoroughly underdrained and worked. It is not necessary that the soil be very rich at the start, for manure can be applied to rather better advantage after the first season's growth.

The plants should be set one and one-half to two feet apart, in rows five and one-half to six feet apart. Great care must be taken when setting the plants not to allow the roots to dry at all, as they are very easily injured. It is not advisable to plant on a drying, windy day, unless the roots are puddled out of water. Root exposure in a wind for but ten minutes may work injury to cause the difference between success and failure. A good way of planting is to put the spade in the ground eight or ten inches, and move it back and forth so as to leave a hole two inches wide and as long as the width of the spade. A boy can follow with the plants, placing one in each hole, drawing the soil in with his foot and treading it firmly on each side of the plant with his heels.

At the end of the first season the plants should be heavily mulched with manure, which will serve the double purpose of fertilizing the plants and smothering any weeds that escape the hoe. If well planted and cared for, a light crop can be picked the following year. No pinching back should be done in the summer, as that causes the canes to send out laterals which do not ripen, but all canes should be cut back in winter or early spring from six to eighteen inches, according to the strength of the canes and the amount of manure given them; the stronger the canes and the more manure used the less cutting back is necessary.

If well cared for and kept clean, a red raspberry plantation can be left for a number of years. For marketing, this berry should invariably be put in pint baskets, in which shape they will usually bring considerably more than enough to pay for all extra cost of the baskets. The crates should hold from twelve to thirty-six pints, to suit different customers, and must be made so the baskets will fit snugly to avoid chucking. The berries should be picked every day to command the highest prices, and should be placed in the retailer's hands immediately after picking if practical. A temporary packing shed should be erected near the middle of the patch for convenience in packing, keeping accounts of pickers, etc.—*Popular Gardening.*

THE NORTHERN SPY APPLE.

For some reason the crop of Baldwin apples hereabouts is this year a light one. The Northern Spy, blossoming several days later, has set well, and a pretty large proportion of the apples marketed have been of this variety. I think the Northern spy bids fair to become a greater favorite than ever in this vicinity, as its requirements become better known. It is a native of this part of western New York, originating about forty years ago as a seedling in Bloomfield, Ontario county, just a little southeast of the Monroe county line. Take it altogether, I do not know an apple that does better for those who have strong, rich land, and understand the proper modes of managing the orchard. It is some advantage, I think, to have a variety which originated near here, provided it has as many good qualities as has this.

When it was first introduced by Rochester nurserymen, about 1845-50, there was a great furore to get trees and grafts. The appearance, quality and keeping habits of the apple were so strongly in its favor, that for several years trees or grafts of this sort were a little dearer than others. There were in those days great numbers of natural fruit orchards, and wherever these were regrafted with Spys the old tree became rejuvenated, and very soon bore large crops of extra fine fruit. It was the success of these regrafted natural trees that for some years gave the Northern Spy its greatest popularity.

Its erect habit and vigorous growth are, I think, responsible alike for the Northern Spy's success under some conditions, and failure in others. The tree, when young, runs too much to wood if either cultivated highly or manured heavily. This retards bearing, and so long as the tree spires upward it will prove a shy bearer. But let it once produce a crop, let its long limbs be weighted down, and the tree is more certain of a crop than most other varieties. It usually produces a light crop one year and a heavy one the next. Its lateness in leaving and blossoming protects this variety from loss by late frosts, though this is an evil rarely encountered in this section of New York so near Lake Ontario.—*American Cultivator.*

HORTICULTURE—PRACTICAL AND THEORETICAL.

To study much a fact called chemistry,
To learn earths, acids, alkalies and all,
To know all seeds, and name all bugs you see—
Is Horticulture Theoretical.

To reason much about the cause of things,
To make analyses and classify
All buds and bodies, leaves, legs, scales and wings,
And give them titles that may pass for high;

To talk for weeks how much of this and that
Is necessary that a plant may grow;
What rainfall, dewfall, sun, wind, cloud are pat,
And then tell others what you do not know;

To raise within a busy cranium
At least six crops before you plant at all;
To write long letters and for papers some,
Is Horticulture Theoretical.

To feel the sunshine and morning dew,
To smell the ground in the first days of spring,
To have for company yourself and you,
To hear the robins and the blue birds sing;

To hoe and harrow, and to put plain dirt
On living seeds, and then to wait awhile;
To be afield in democratic shirt,
And use your muscles in plebeian style;

To take all nature in your hardened hands,
Train trees, train vines, plant, prune, protect and pluck,
Believe in self and in your fertile land,
And have more faith in living than in luck;

And then at last to sit in welcome style,
With golden fruits heaped up in royal state,
Offered by beauty, with a gracious smile,
To strangers dwelling in the city gate;

To taste, to eat, to feel the throb of pride,
To rise rejoicing from the festival,
To clasp new friends with old ones by your side,
This, this is Horticulture Practical.

– *Prof. J. C. Ridpath, at American Horticultural Society.*

HONESTY.

Let us away with all stuffings and facings, with all deceptive coverings, with all undersize packages, with the packing of all green, half-grown, knarly and worm-eaten fruit in any kind of packages. If we must pack it, put it on top where it will tell its own story. Let us do this, and we shall find it will pay in money, pay in the plaudits we shall win from all men and in our own self-respect and integrity of soul. I should say here, and I cheerfully do say, that I believe that the California fruit packers are generally far less open to criticism in this matter of straight packing than are the majority of Eastern growers. You cannot afford to pay freight on trash two or three thousand miles. Yet there is some room for improvement in the selection and grading of fruits from this pre-eminent horticultural State. It cannot be too often or too earnestly impressed upon fruit men everywhere that to secure the best results the most scrupulous pains must be taken not only in growing fruit properly, but in careful handling, thorough grading and unflinching honesty in packing. The man with a high standard, well worked up to, is the man who will come out best in the race.—*Parker Earle, at American Horticultural Society.*

COLD STORAGE.

Information on cold storage was asked of the eastern members, and Parker Earle was asked to respond. He stated that it had been a common impression that after fruits of any kind had been subjected to the cold—tender ones especially—that their keeping qualities were nearly destroyed and they decayed soon in a warm climate. This was negatived by his own experience, as he found that fruit could be sent more safely after being cooled down to a low temperature than when not so treated. He used the car itself as a cooling place and the fruit was loaded directly from the field. He found that this held true not only for strawberries but for raspberries. When they were cooled below the dew point, moisture collected upon the fruit, but he found that it did not essentially injure the fruit, as the moisture soon evaporated. A refrigerator car simply holds the fruit in obeyance, so that organic action is held back for a time.

When the fruit is packed in a firm condition it does not essentially change when taken out, although, when the fruit is put in over ripe, it will not keep long.—*Parker Earle, at American Horticultural Society.*

Pomological and Horticultural Societies.

Below is given a list of those Pomological and Horticultural societies and their Secretaries, in the different States, with which our Society is in correspondence, and with which it exchanges Reports and Transactions. We should be very glad to extend the list so as to embrace all societies of this nature in every State in the Union.

American Pomological Society. Charles W. Garfield, Secretary, Grand Rapids, Michigan.

Department of Argiculture of the United States. Hon. Norman J. Colman, Commissioner, Washington, D. C. Hon. Henry E. Van Deman, Chief of Division of Pomology.

American Horticultural Society. W. H. Ragan, Secretary, Greencastle, Indiana.

Society of American Florists. Edwin Lonsdale, Secretary, Philadelphia, Penn'a.

Massachusetts Horticultural Society. Robert Manning, Secretary, Boston, Mass.

Western New York Horticultural Society. P. C. Reynolds, Secretary, Rochester, N. Y.

New Jersey State Horticultural Society. E. Williams, Secretary, Montclair, N. J.

Pennsylvania Fruit Growers' Society. E. B. Engle, Secretary, Waynesboro', Penn'a.

Ohio State Horticultural Society. George W. Campbell, Secretary, Delaware, Ohio.

Wisconsin State Horticultural Society. H. C. Adams, Secretary, Madison, Wisconsin.

Indiana Horticultural Society. C. M. Hobbs, Secretary, Bridgeport, Indiana.

State Horticultural Society of Michigan. Charles W. Garfield, Secretary, Grand Rapids, Michigan.

Maine State College Agricultural Experiment Station. W. H. Jordan, Director, Orono, Maine.

Illinois State Horticultural Society. A. C. Hammond, Secretary, Warsaw, Illinois.

Iowa State Horticultural Society. G. B. Brackett, Secretary, Denmark, Iowa.

Missouri State Horticultural Society. L. A. Goodman, Secretary Westport, Missouri.

Kansas State Horticultural Society. G. C. Brackett, Secretary, Lawrence, Kansas.

Nebraska State Horticultural Society. Samuel Barnard, Secretary, Table Rock, Nebraska.

State Board of Horticulture of California. A. H. Webb, Secretary, San Francisco, California.

Minnesota State Horticultural Society. S. D. Hillman, Secretary, Minneapolis, Minn.

Columbus Horticultural Society. W. S. Devol, Secretary, Columbus, Ohio.

Colorado State Horticultural Society. Nelson Millett, Secretary, Denver, Col.

Massachusetts Agricultural College. Hon. Henry H. Goodell, President and Librarian, Amherst, Mass.

New York State Agricultural Experiment Station, Geneva, N. Y.

Entomological Department of the State of Illinois. Prof. S. A. Forbes, Entomologist, Springfield, Ill.

Ohio Agricultural Experiment Station. N. S. Townshend, Director, Columbus, Ohio.

Department of Fruit Pests, California State Board of Horticulture. W. G. Klee, Inspector of fruit pests, Sacramento, Cal.

North Carolina State Horticultural Society. S. Otho Wilson, Secretary, Vineyard, N. C.

California State Board of Viticultural Commissioners. Chas. A. Wetmore, Chief Viticultural Officer, Sacramento, Cal.

Fruit Growers' Association of the Province of Ontario. L. Woolverton, Secretary, Grimsby, Ontario.

Montreal Horticultural Society. E. J. Maxwell, Secretary, Montreal, P. Q., Canada.

Entomological Society of the Province of Ontario. Edmund Baynes Reed, Secretary, London, Ontario.

Fruit Growers' Association of Nova Scotia. C. R. H. Starr, Secretary, Port Williams, N. S.

Ontario Department of Agriculture, Entomological Division. James Fletcher, F. R. S. C., Entomologist, Ottawa, Canada.

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