Public Documents of Maine:

BEING THE

ANNUAL REPORTS

OF THE VARIOUS

Public Officers and Institutions

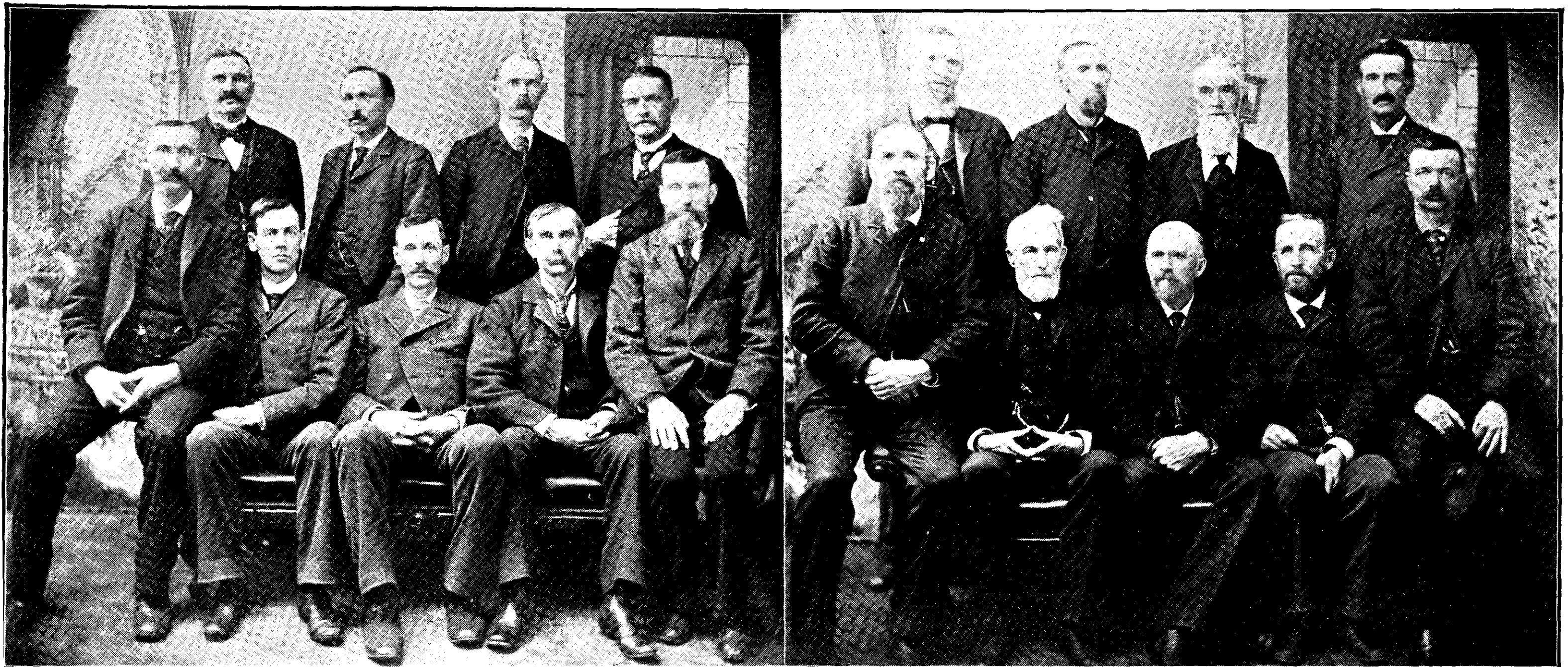
FOR THE YEAR

1895

VOLUME II.

AUGUSTA:
BURLEIGH & FLYNT, PRINTERS TO THE STATE.
1895.

W. H. Moody. W. H. Jordan. E. E. Light. Geo. Flint. S. F. Stetson. J. W. Dudley. Geo. N. Holland. T. E. Skolfield.



R. Smiley, Clerk. C. E. Wheeler. J. M. Winslow. L. O. Straw. F. H. Mooers. L. G. Smith. W. H. Vinton. B. F. Briggs. B. W. McKeen, Sec'y. W. H. Snow.

MEMBERS OF MAINE BOARD OF AGRICULTURE, 1894-95.

AGRICULTURE OF MAINE.

THIRTY-SEVENTH ANNUAL REPORT

OF THE

SECRETARY

OF THE

BOARD OF AGRICULTURE,

FOR THE YEARS

1894-95.

PRINTED BY ORDER OF THE LEGISLATURE.

AUGUSTA:
BURLEIGH & FLYNT, PRINTERS TO THE STATE.
1895.

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 years 1894 and 1895.

B. WALKER McKEEN, *Secretary*.

AUGUSTA, May 1, 1895.

MAINE BOARD OF AGRICULTURE—1894.

OFFICERS.

A. W. GILMAN, President.

O. GARDNER, Vice President.

B. WALKER McKEEN, Secretary.

Members Chosen by County Agricultural Societies.

			Term expires 3rd Wed. in January.	
Hancock	County,	Vacancy.		
Piscataquis	"	A. W. Gilman,	Foxcroft,	1895
Penobscot	"	Joel Richardson,	No. Newport,	1895
Franklin	"	F. B. Hunter,	Strong,	1895
Knox	"	O. Gardner,	Rockland,	1895
Aroostook	"	Ira J. Porter,	Houlton,	1895
Androscoggin	"	B. F Briggs,	Auburn,	1896
Kennebec	"	F. H. Mooers,	Pittston,	1896
Waldo	"	W. H. Moody,	Liberty,	1896
Washington	"	L. G. Smith,	Pembroke,	1896
Lincoln	"	John M. Winslow,	Nobleboro,	1896
Cumberland	"	W. H. Vinton,	Gray,	1897
Oxford	"	S. F. Stetson,	Sumner,	1897
York	"	B. F. Pease,	Cornish,	1897
Somerset	"	Geo. Flint,	No. Anson,	1897
Sagadahoc	"	T. E. Skolfield,	Brunswick,	1897

Members from State College.

President, A. W. Harris, Orono.

Elected by the Board.

B. Walker McKeen, Secretary.

MAINE BOARD OF AGRICULTURE—1895.

OFFICERS.

L. G. SMITH, President.

W. H. VINTON, Vice President.

B. WALKER McKEEN, Secretary.

Members Chosen by County Agricultural Societies.

			Term expires 3rd. Wed. in January.	
Hancock	County.	Vacancy.		
Androscoggin	"	B. F. Briggs,	Auburn,	1896
Kennebec	"	F. H. Mooers,	Pittston,	1896
Waldo	"	W. H. Moody,	Liberty,	1896
Washington	"	L. G. Smith,	Pembroke,	1896
Lincoln	"	John M. Winslow,	Nobleboro,	1896
Cumberland	"	W. H. Vinton,	Gray,	1897
Oxford	"	S. F. Stetson,	East Sumner,	1897
York	"	L. O. Straw,	Newfield,	1897
Somerset	"	George Flint,	North Anson,	1897
Sagadahoc	"	T. E. Skolfield,	Brunswick,	1897
Aroostook	"	J. W. Dudley,	Castle Hill,	1898
Franklin	"	C. E. Wheeler,	Chesterville,	1898
Knox	"	E. E. Light,	Union,	1898
Penobscot	"	Geo. N. Holland,	Hampden,	1898
Piscataquis	"	W. H. Snow,	Milo,	1898

Members from State College.

President, A. W. Harris, Orono.
Prof. W. H. Jordan, Orono.

Elected by the Board.

B. Walker McKeen, Secretary.

MAINE BOARD OF AGRICULTURE.

ANNUAL MEETING 1895.

The annual meeting of the Maine Board of Agriculture was held at the office of its secretary, State House, Augusta, January 16 and 17, 1895.

WEDNESDAY, A. M., January 16.

In the absence of the President and Vice President the meeting was called to order by the Secretary, B. Walker McKeen, who read the call for the meeting. As there were a number of new members present the first business brought before the Board was the appointment of a committee on credentials. It was voted that this committee be appointed by the chair, and the following named gentlemen were so appointed:—Mr. Skolfield, Mr. Vinton and Mr. Winslow. After examining the credentials of the new members the committee reported as follows:—We find the following named gentlemen have been duly elected and are entitled to seats, viz: Franklin county, C. E. Wheeler, for the term of three years; Piscataquis county, W. H. Snow, for the term of three years; Penobscot county, George N. Holland, for the term of three years; Knox county, E. E. Light, for the term of three years; Aroostook county, J. W. Dudley, for the term of three years; York county, L. O. Straw, for the unexpired term of B. F. Pease, two years.

State College, ex-officio, Prof. W. H. Jordan in place of Walter Balentine, deceased.

Voted, That the report of the committee on credentials be accepted; and the gentlemen whose names were reported were declared elected members of the Board for the term of years set opposite their respective names.

Voted, That the chair appoint a committee to receive, sort and count votes, and the appointment was made as follows:— B. F.

Briggs, Androscoggin county, C. E. Wheeler, Franklin county, F. H. Mooers, Kennebec county.

Voted, That Mr. A. R. Smiley serve as messenger for the Board during this meeting.

The election of officers was next in order, and the ballot for President resulted in the choice of L. G. Smith.

MR. SMITH.

Members of the Board of Agriculture:—I thank you for the confidence that you have placed in me in electing me as your presiding officer. I feel that you have honored me, that to preside over the Board of Agriculture is an honorable position. I hope that I shall be able to perform that service faithfully, impartially and satisfactorily to the Board. I shall not attempt to make a speech because I am not a speech-maker; but there are one or two matters that I wish to speak of before we proceed to business;—that we represent the interests of more people of the State of Maine than are engaged in any other business, and that we have met here for the purpose of mapping out and planning for a year's work, and, I hope, benefiting the farmer and increasing the interest in agriculture. There has been for the last two years a great depression in business throughout the country. Thousands of men have been thrown out of employment and therefore are seeking for something to do, and their attention has been turned to agriculture as a last resort. Consequently we have a greater number engaged in that business than we have ever had before. Our object is now to try to benefit these people. The business of agriculture is new to them, and if we can in some way assist them in the line of work which they have adopted, it is our duty and our business to do so.

I hope that the business which is done here to-day will be done harmoniously, with good will and for the interest of agriculture throughout the State. Thanking you again for your installation, the chair now awaits your pleasure.

Proceeded to cast votes for Vice President, and the committee to receive, sort and count votes reported W. H. Vinton elected to that office.

Voted, That Brother Wheeler be authorized to cast a ballot for the present Secretary of the Board. The vote was cast and B. Walker McKeen declared elected Secretary of the Board for the next three years.

Voted, That the Secretary be authorized to cast a ballot for the Board in electing the executive committee, and that that committee consist of the President and Vice President. The vote was cast and L. G. Smith and W. H. Vinton declared elected members of the executive committee.

Voted, That the committee proceed to receive, sort, and count votes for a third member of the executive committee, and B. F. Briggs was chosen as that member.

Next in order was the election of a member of the advisory council of the Experiment Station. It was moved that the messenger be instructed to cast a ballot in behalf of the Board for the Secretary as that member.

Mr. McKeen—I have been on that Experiment Station council for some years. I have endeavored to do as good work as I could, and would be very pleased, so far as I am personally concerned, to remain on it longer; but it strikes me that there are some members of the Board who could do just as good work, and it might be well to select some member and allow him to take part in that advisory council.

Mr. Vinton—I want to say a word upon this matter, and I want to say it now because it comes in exactly right. There are some things done in this world that are wrong. and when things have been done wrong there should come a time when the persons who did them will see their mistakes and be willing to rectify them.

It was stated in the Board meeting last year that some years ago an attempt was made to establish fair and legal relations between the college and the Board, which resulted in making the president of the college and the professor of agriculture members of the Board ex-officio; and on the part of the Board it was also enacted that the Secretary of the Board should be a member of the trustees ex-officio. Now the legislature a few years ago repealed that law by which the Secretary of the Board of Agriculture was connected with the State College ex-officio,—cut off that ex-officio. Some of us know how that happened to be done; but now the persons have gotten over that little spite, and I think the legislature would be willing to rectify that mistake if its attention was called to the matter. I make the suggestion that some time during the present session the matter be presented to the legislature, and it be requested to revise that vote, and again make the Secretary of the Board a member of the State College ex-officio. I make this suggestion now because it seems to me that when the legislature looks back and sees its want of wisdom in cutting off that ex-officio, and sees that the flurry is all passed over, it will be willing to restore it.

Mr. McKeen—Mr. Vinton has stated the matter as it occurred but that would hardly help us out of the matter of a member of the council. Those ex-officio officers were removed some years ago, but this experiment station council is an advisory board consisting of one member from the Pomological Society, one from the Board of Agriculture and one from the State College. Whether or not the Secretary should be a member of the trustees would not affect the election of a member of the experiment station council.

Mr. Moody—I had some little talk with Mr. McKeen about this matter last year. He said he thought perhaps it would be better to have some other man, and I thought so myself; not but what Mr. McKeen could do as good work as anybody, and perhaps under the circumstances better, but the college has lacked for sympathy in some parts of the State, and would it not be better to take a man from some other part of the State? Brother McKeen's sympathy is with the college, and he will do all the work he possibly can for it all the year through; but if we should take a man from some other part of the State where the college and its workings are not so well known wouldn't it be an advantage to the college? I think that is what is in his mind, and it is in my mind as well. I think it would be better for the interests of the college to take a man from a part of the State where the college has not been so well represented. A man from Gray, for instance, —if he were on the advisory board would have an interest in it and talk about it to his neighbors, and would not the college get sympathy and gain strength and is not that what the college needs?

Mr. Vinton—I think Brother Moody does not mean that we should take a man from outside for the sake of converting him.

Mr. Moody—Oh! no, I want to do what would be for the best interest of the college; but my idea was that in that way the college might get some interest and sympathy where it has none.

Mr. Briggs—I think the college people are very well satisfied with Mr. McKeen; and as for the college being well advertised, I think he is in a better condition to advertise it than any other member on the Board, as he is travelling through the State all the time. I shall vote for Mr. McKeen.

Voted, That the Board proceed to the election by ballot of a member of the advisory council of the Experiment Station, and

B. W McKeen was unanimously elected as a member of that council.

Voted, That a committee on pay roll be appointed by the chair. The appointment was as follows:—S. F. Stetson, Oxford county, B. F. Briggs, Androscoggin county, G. N. Holland, Penobscot county.

Mr. Briggs declining to serve on this committee, Mr. W. H. Vinton was appointed in his place.

Mr. Briggs now stated to the Board that he had arranged for a special train to take three committees from the House and Senate,—the committee on the college, the committee on agriculture and the educational committee,—to the State College Friday morning; and he extended an invitation to the Board to accompany them on that excursion. The train had been secured for one hundred dollars, with forty passengers ensured, and there would be no hotel bills as the college would furnish entertainment. The train would return Friday evening.

This invitation was accepted.

Mr. WHEELER—I have a matter which I am somewhat interested in which I wish to bring before the board prior to the dinner hour. Go where you will in this building you find the faces of those who have done whatever was right and whatever they could for the shaping of the laws of this State, hanging from the walls; but we have none of those in this room, no pictures of the ex-secretaries of the board. I wish for one that the pictures of those ex-secretaries, especially that of Dr. Holmes, could hang from these walls. I presume there can be obtained somewhere, something from which to get a copy, and I move that the executive committee be instructed to procure such pictures and have them hung upon these walls as they may deem best. I do not know that there are any funds to pay for those pictures if they should be procured, still I understand that there is a fund in the State that is available if the matter can be worked around right. Therefore I move that it be left to the executive committee to attend to the matter.

Th s motion submitted and carried.

Adjourned until 2 o'clock.

AFTERNOON SESSION.

Called to order by the President. On motion of Mr. Briggs, the report of the Secretary was presented, as follows:

SECRETARY'S REPORT.

Members of the Board of Agriculture—In making my report of the work of the Board and the condition and progress of the agriculture of our State for the past year, I am pleased to say that I believe the progress spoken of in my last report has been fully maintained. The conditions were never better, in my judgment, than to-day, for a continuance of the advance in our farm practices which is everywhere so apparent. The rank and file of our farmers have ceased to stand with their backs to the future and are on the alert to catch every possible idea that may help them to improve their methods and increase their revenues. The returning tide of prosperity which is showing itself in our manufacturing and mercantile pursuits is having its effect upon our agriculture, and the demand for most of the products of the soil is steadily increasing with a corresponding increase in prices. It may not be out of place for me to say, that I note, as must every one who mingles much with our people, that there is a constant improvement along social lines as well. The agriculturist is becoming more and more an important factor in our body politic, and it only remains for him to keep steadily on in the course of self culture and self elevation to continue to be more and more respected. As a proof of this I wish to quote a few words from the governor's address. In speaking of agriculture he said:

"When we consider that here are sixty-five thousand farms in Maine, containing 6,552,578 acres, and of an estimated cash value of $192,557,615, producing farm products in 1893 of the value of more than twenty-two million dollars, we can fully appreciate that this great interest should never have a secondary place in our efforts to advance the prosperity of the commonwealth.

The State Board of Agriculture, organized and endowed for the purpose of holding farmers' institutes, has been unusually successful in its work, and its meetings have been more fully attended during the past two years, and greater interest has been manifested than ever before. We have two State agricultural societies, one State pomological society, and over fifty county and town agricultural societies, paying out annually more than $73,999 in premiums.

Throughout the State, organizations of the grange are quickening the public mind, and inaugurating advanced and improved methods in agriculture, which will surely lead to a higher prosperity, and more productive results to the husbandman.

A good market, easy of access by rail or convenient roads, is one of the important elements in the advancement of the farming interests of the State; and continuous harmonious combination of effort on the part of our industrial, agricultural and other interests, will be beneficial to all.

The investment of capital in the development of our vast waterways, the erection of new mills and manufactories, the creation of new industries, opening up a wider field for the employment of labor, will create new homes, build up communities, and establish a permanent home market for the products of the farm. Diversified industry will encourage our agricultural progress and make us stronger, greater and more powerful as a State.

The season of 1894 may be classed as one of peculiar productiveness upon our Maine farms. While much of the West and some portions of New England were suffering from the effects of a severe drought in the early part of the summer, Maine was comparatively free from it. Her crops were constantly growing, pushing forward toward an abundant harvest.

All kinds of stock came through the winter in fine condition, there being an abundance of fodder in nearly every community. The pastures and fields gave abundant promise of a heavy growth of fodder early in the season and the promise was fulfilled.

The amount of grain sown was considerably larger than in 1893, and the yield of straw was above an average, but on account of a rust which struck the leaves quite early, as well as peculiar climatic conditions the grain was somewhat light. There is a growing tendency towards sowing mixed grains, and on many of our dairy farms they are fed without threshing.

The hay crop was above an average and with the exception of some localities in the central parts of the State and in Aroostook county where showers prevailed for nearly a month during the haying season, was secured in fine condition.

The potato crop will not equal that of 1893 by a slight margin.

The fruit crop, although threatened in the early part of the season, was far above that of 1893, and in many localities was well up to an average.

While the corn crop was considerably above the average, nearly all of our canning factories being obliged to refuse to take some of their corn on account of the large yields.

There has been built the past season sixty silos, many of them having been filled with the fodder from sweet corn, after the ears had been picked for the factory. As far as I have received reports from those new silos they are giving excellent satisfaction.

The tendency to make the farms more self-supporting is rapidly gaining ground, and with this increase in the number of silos we look for quite a lessening of the farmers' grain bills, particularly where the whole corn is ensiloed.

The use of machinery for planting, cultivating, and harvesting crops is increasing, and the cost of production is thereby materially lessened; particularly the growing of potatoes. We have several fields reported where the only hand work was the picking.

EXECUTIVE COMMITTEE.

The executive committee of the Board has again done good service, having been called together three times, June 5th at the Bangor House, Bangor; September 5th at the State Fair grounds, Lewiston; and at Hotel Willows, Farmington, on December 4th; each time in connection with other work of the Board, so no separate account of the expense was kept. Their actions have been made a matter of record, and appear in their report as presented at this meeting.

A meeting of the full Board was held at the Bangor House, Bangor, on the occasion of their visit to Orono, Field Day, June 6th, and nearly every member of the Board was present. At Hotel Willows, in connection with the State Dairy Meet.

I wish to say that in the investigation of the sale of oleomargarine I have had the active support and co-operation of the experiment station, where all the samples purchased have been analyzed, Prof. Jordan and Prof. Bartlett, his chemist, appearing as witnesses in court.

FOUL SEED.

Many complaints have come to our attention relative to the introduction of weed pests upon our farms through grain and grass seed purchased from the West. Samples of these have been sent this office, and forwarded by me to the botanist at Orono. He has reported them to be crantz, false flax, or gold of pleasure, and winter cress, of the mustard family, Canada thistle and chicory of the sunflower family. As in many cases these weeds were not known in the neighborhoods before this season they must have come from the seed. Their introduction and dissemination over our State can but be viewed with alarm, and I urge that the board take some action relative to the matter by recommendations to the legislature looking toward some definite system of seed inspection

NUTRIOTONE.

In our crop bulletin for October the following statement appeared :

A New Food Fraud.

There have been various preparations placed on the markets in recent years claiming to contain certain mysterious qualities which made them a specific for all diseases of domestic animals.

A sample of one of these, called Nutriotone, manufactured by the Thorley Food Company of Chicago, and sold for twenty-five cents per pound, was sent this office by Mr. Asa L. Ricker of Biddeford.

The claim is made for it that it is not only a great medicine but a food also, and all are urged to buy it for that reason. The analysis which follows exposes all of these claims and stamps it as a tremendous fraud.

ORONO, October 1, 1894.

B. W. McKEEN—The sample of Nutriotone consisted largely of linseed meal with a little fenugreek and apparently some pea or bean meal. It contained 18.67 per cent ash, a large part of which was common salt.

Yours truly,

L. H. MERRILL, *Chemist.*

Further events revealed the fact that there were large quantities of the food on sale in the State, some of which was not paid for, and as in some instances dealers refused to pay for it, relying on the evidence of our analysis for defence, and as the sales to farmers immediately stopped, agents of the Food company visited the offices of the Board and Experiment Station seeking redress for what they claimed was an irreparable injury to a legitimate business. But when they were met with the cold facts and fully realized their position, they begged for time to change their name and start as a medicine company; but as we have heard nothing from them to that effect the supposition is that they are still pushing their "food," and we are therefore still pushing our objections to it and advertising its true character.

CROP BULLETINS.

The publication of the monthly crop bulletins was continued through the growing season with increasing interest. The circulation has increased from 3.500 in 1893 to 4,300 in 1894. Replies from the various correspondents have been more complete than ever before, and have largely increased in numbers. So much so that it has been necessary to use the lightest possible paper and the smallest of type in order to keep within the two ounce limit of weight. It has been necessary to drop some valuable replies from nearly every issue on this account.

The new additions of questions from correspondents and the monthly crop reports from the department at Washington have been fully appreciated and have added to their value. An effort should be made to have these bulletins entered as second-class mail matter, in order that they may be somewhat enlarged and the circulation further extended. This can be done, I believe, by establishing a nominal subscription price for them and allowing the columns to be open for advertisements. The postal law against free publications is designed to protect the mails from the various advertising pamphlets with which the country is flooded and which are of a purely private nature. A gentleman was in the office a few days ago who said he was getting these bulletins every month, and there were forty of his neighbors who would be very glad to receive them, and asked if it were possible to extend the list. It must necessarily be considerably increased the coming season.

NEW SYSTEM OF PURCHASING CREAM.

With the introduction of the Babcock test into our creameries there came a necessity for some definite system of weighing or measuring cream. Cutting away from the inch plan, the Goss space pail has come into general use, and it is a vast improvement over any previous method. By this system the gallon is divided into two spaces; and upon the assumption that a gallon of cream will always weigh eight and one-half pounds and that all commercial butter contains eighty-five per cent of butter fat, the amount of these spaces multiplied by the per cent of fat will give the amount of butter produced by each patron's cream. That there has been errors in this had been very apparent, and the matter has been fully discussed by representatives of the Board and the Experiment Station. Professor Jordan gave a talk on the subject at the Foxcroft dairy meeting in 1893 and the matter was further discussed at Farmington by Professor Bartlett; it being the object of all interested to introduce some system of purchasing by weight and dividing the proceeds by the amount of butter fat purchased. This is entirely practical and desirable and I believe the Board should make some recommendations in the matter. I append a letter from one of our most successful creameries which shows how the system works; although the proprietor has not fully carried out the plan proposed by us he has made a good beginning.

FOXCROFT, MAINE, January 10, 1895.

B. WALKER MCKEEN,

Secretary of Maine Board of Agriculture:

My Dear Sir—Among the many good things that interested me at the State dairy meeting at Farmington this year, was a talk by Prof. Bartlett, of the State College, on how best to buy cream of the farmers. And you will remember he advocated weighing the cream, and, by the way, the same idea was advanced at the State dairy meeting at Foxcroft one year ago, and I remember you was very enthusiastic over the matter. I have since coming from Farmington adopted this method and so far like it very much.

I have arranged on my sled that I collect with, an upright piece of five-eighths inch iron that forks at the base and is securely bolted to the side of the sled. At the top end it is bent in the shape of a goose neck. On this I hang a scale; then I have a large galvanized iron pail that holds 100 pounds, and for a sampler use a straight piece of brass pipe three-eighths inch in diameter. I also have a case that holds twenty sample bottles. When arriving at the farmer's door the pail, sampler and sample case are taken to the creamer, the cans are taken from his tank and the cream turned into the pail. Then the sampler is let down into the pail of cream slowly. In this way I get a column of cream in the sampler just the same as is in the pail. Then the thumb is put over the top of the sampler, and it is taken from the pail. Then I put the lower end of the sampler into the neck of the sample bottle, remove my thumb, and I have the sample of cream. Then the pail is taken to the sled, weighed and turned into the gathering cans, and so on until the route is all gathered. On arriving at the creamery these samples are tested by the Babcock test and the per cent of butter fat is multiplied by the number of pounds of cream taken from each patron. This will give you the amount of butter fat. Now add fifteen per cent and you have commercial butter. Care should be taken in getting the sample, and if taken as it should be the test and churn will agree, and each one will get pay for just the kind of cream they furnish.

A great deal can be said in favor of this method but I have not time to say more, and will say in closing that after buying cream for the last eight years I feel that I had just got onto the right method and the only true way and fair way for both creameries and farmers.

Yours very respectfully,

C. C. NICHOLS.

It would also seem to be wise that this Board should consider the matter of requiring a certificate of competency from some good authority on the part of all creamery operators who use the Babcock test. Complaints often come to me of results obtained at some of our factories which appear to be caused by improper sampling of the cream, or inaccuracy in handling the tester; and I hope this matter may be fully discussed at this meeting and that some definite recommendations may be made.

FARM CATALOGUE.

Acting on the instructions of the Board we sent circulars to the town officers in the various towns and cities of the State asking for a list of farms that were for sale. Blanks were sent to all whose names we received, and the result was returns from 192 farm owners, offering their farms at prices ranging from $500 to $3,000.

Of these, Androscoggin county has 7; Aroostook county has 6; Cumberland county has 13; Franklin county has 13; Hancock county has 12; Kennebec county has 16; Knox county has 3; Lincoln county has 3; Oxford county has 21; Penobscot county has 27; Piscataquis county has 11; Sagadahoc county has 7; Somerset county has 12; Waldo county has 13; Washington county has 17; York county has 11.

It had been thought that the printing of this catalogue might be put into our general appropriation for printing, but on account of the rapid increase in the number and size of the monthly crop bulletins, and the consequent increase in the expense of same, it has been thought better to defer the printing until after this meeting, allowing a discussion of the matter and the taking of such action as the board may see fit.

THE PRESS.

The thanks of this department are still due the press for extended notices of our meeting, which have been given by all the papers of the State; and for the complimentary and concise reports and reviews of our work which have from time to time been published. The benefits resulting from these courtesies can hardly be overestimated.

EXCHANGES.

Our exchanges remain the same as last year with the addition of the Ohio Practical Farmer and Rockland Daily Star. Through the thoughtfulness of Dr. Harris we have been enabled to procure a complete set of the Experiment Station Record, a valuable publication from the directors of experiment stations at Washington, and it should be permanently bound for preservation in our library.

INSTITUTES.

Before reporting the institutes I wish to acknowledge the valuable assistance I have received from the members, and to say that much of the success of these meetings depends upon the efforts of each member in his own county. Much remains to be done by way of advertising, and working up these meetings, which must of necessity be done locally; and we urge upon every member the necessity for putting much effort into preliminary work; attending to it as far as possible personally.

No new departures have been undertaken in our institute work except the dropping out of the morning meeting in several instances. And it seems to be proven that, except in some few larger places, it hardly pays to take along an extra speaker for this meeting as the audiences are apt to be the smallest of the meeting.

While our subjects and speakers have been chosen mostly at the suggestion of the members we have endeavored to work in a fair amount of matter relating to the building up of a home and a broadening of character and citizenship, as well as that relating to the routine work of the farm. In this way we have interested the young and have been able to bring out to our meetings and hold the attention of many who could not have been reached otherwise.

The permanent record of the meetings and costs of each have been continued. The time for holding the institutes reported is from the annual meeting of 1893-4 to the present meeting, and they are as follows: South China, January 19th—Subjects, Dairying as a Means of Disposing of Our Hay Crop, Principles of Fertilization, and What Constitutes a Successful Farmer. Danville Junction, February 5th—Subjects, Principles of Feeding, Fertilizing Value of Cattle Foods, and Milk and Its Variations. West Minot, February 6th, same subjects as at Danville Junction. Wilton, February 7th—Subjects, Breeding and Care of Poultry, Live Stock and Dairy Tests at the World's Fair, and Farm Economics. Rockland, February 9th—Subjects, Balanced Rations for Cattle, Use of Commercial Fertilizers, and The Dairy Tests at the World's Fair. Riverside, February 10th, with same subjects as at Rockland, with addition of President Harris on Education. Canton, February 26th—Subjects, Increasing the Productiveness of Our Farms, and What Constitutes a Successful Farmer. Farmington, February 27th—Subjects, Relations of Dairying to the Fertilizer Trade, Principles of Feeding, and Orcharding. North Parsonsfield, March 1st, subjects the same as at Farmington. Newfield, March 2d—Subjects same as at Farmington. Lincolnville, March 7th—Subjects, Can We Reduce the Cost of Producing Cream, Growing Farm Crops, and Silos. Thorndike, March 8th, subjects same as at Lincolnville. South Lewiston, March 9th, subjects same as at Thorndike. Newcastle, April 3d—Subjects, Farm Insurance, Dairying, and Fruit Growing. Lamoine, June 21st—Subjects, Associated Dairying, Poultry Growing and Sheep Husbandry. Orland, June 22—Subjects, Associated Dairying, and Dairy Education. Penobscot, June 23—Subjects, Animal Husbandry, Associated Dairying and Past, Present and Future of Our Agriculture. North Sedgwick, June 25th, subjects same as at Penobscot. Amherst, August 25th—Subjects, Plows and Plowing, Dairy Education and Past, Present and Future of Our Agriculture. Evening meeting at State Fair grounds, Lewiston, September 5th—Subject, Industrial Education. Bristol, October 30th—Subjects, Dairying, Necessary Expenses of the Farm and The Right Education for the Farmer. Alna, October 31st, same subjects as at Bristol. Sherman, November 5th—Subjects, The Silo for Aroostook County, Care of Farm Crops and Leaves from My Note Book. Houlton, November 6th—Subjects, same as at Sherman, with the addition of President Harris on Industrial Education. Amity, November 7th—Subjects, Care of Farm Crops and Advanced Agriculture and Dairying. Monticello, November 8th, South Presque Isle, November 9th, Princeton, November 12th, Cherryfield, November 16th, with same subjects as at Amity. Parkman, November 19th—Subjects, Increasing Farm Resources, Dairying and Stock Feeding and The Poultry Yard on the Farm. Dexter, November 20th—Subjects, Stock Feeding, Dairying and Orcharding. Corinth, November 21st, subjects same as at Dexter with the addition of Oil Wells of Ohio. Glenburn, November 22nd—Subjects, Stock Feeding, Corn Growing, The Farmers' Garden and Leaves from My Note Book. Fairfield Centre, November 23rd—Subjects, Horse Raising, Dairying and Corn Growing and Small Fruits. North New Portland, November 24th—Subjects, Orcharding, Dairying and Corn Growing and Increasing Farm Resources. East Auburn, November 26th—Subjects, The Market Garden, Dairying and the Silo, Feeding and Care of Stock and Small Fruits. Andover, November 27th, Peru, November 28th, with same subjects as at East Auburn. Richmond Corner, November 30th—Subjects, Orcharding, Dairying and Corn Growing and Increasing Farm Resources. Brunswick, December 1st—Subjects, Farm Fertilizers, Dairying and Corn Growing and Small Fruits. South Hope, January 4, 1895—Subjects, Farm Fertilizers, and Dairying. Thomaston, January 5th, subjects same as at South Hope.

The Joint Winter Meeting with Pomological Society, January 8th and 9th; Phillips, January 11th—Subjects, Crops for a Dairy Farm, Farm Fertilizers, and Good Food from the Garden. The total number is 44. Total cost, $1546.85. Total attendance, 6,705. Average cost, $35.15. Average attendance, 152. Increase from last year's attendance of 18, and from that of 1892 of 49.

It may not be out of place to state that in the term of three years we have held 126 institutes at a total cost of $6,402.81, and an average cost of $50.81. With the exception of a few small bills which have not been secured, we were square with the appropriation for 1894. These and the expenses of the meetings held since January 1st, amounting to $107.05, will come out of the appropriation for 1895.

OTHER MEETINGS.

In addition to these institutes and State meetings the board attended the annual Field Day meeting at Orono, at a cost of $123.50; expenses, Eastern Maine fair, $18.34; Maine State fair, $72.80, including expenses of music, at the evening meeting of the Pomological Society. I have also paid for office work, stenographer and sundries, $208.36. A total of $423.00, which added to $1,439.00 gives the balance of the 1894 appropriation, expended since the last annual meeting.

On April 4th, President Gilman and myself attented a joint meeting with the officers of the Maine State and Eastern Maine Fairs, for the purpose of arranging the special dairy premiums, to be offered by these societies in 1894. On June 19th, attended the Commencement exercises at the Maine State College. August 28 to 31, attended Eastern Maine Fair at Bangor, and occupied the rooms of the Board, repaired by President Bass. Many more callers were received than in any former fair. Professor Gowell and myself had charge of the milk testing for the butter fat contest. September 4 to 7, attended Maine State Fair at Lewiston, occupying the parlor in President's headquarters. Tested the milk as at Bangor.

REPORTS.

By an act passed in 1893 the size of the report of the Board was limited to 500 pages, the number reduced from 12,000 to 10,000 on the off years, and 25 per cent of them caused to be bound in paper. In consideration of the increasing amount of matter which must necessarily be published and the large and growing demand for these reports, we feel to urge that the Board take some action looking towards the publishing of the usual number at least, and the removal of any limit as to size. Because of the matter they contain which is of a permanent character, they are usually kept in libraries, and uniformity of binding therefore becomes very desirable. It is to be hoped that a recommendation be made at this session to the committee on printing and binding that the whole number be bound in cloth hereafter, as has been the practice for many years. A constant effort has been made to get the reports out very much earlier in the season than formerly, and while we have not succeeded as well as we hoped, a beginning has been made. Quite an amount of copy for the report of the past year has been placed in the printer's hands, and several forms have already been set up. So we have a fair assurance that it may be completed earlier in 1895 than ever before.

AGRICULTURAL SOCIETIES.

I visited more of the fairs held this season than formerly, and was pleased to note the success that attended most of them. From the tabular statements which follow, it will be seen that the amount of premiums has increased materially over those of 1893. I was sorry to find a somewhat increasing tendency toward the sanctioning of gambling devices on the grounds of some of our societies; and I suggest that it might be well to urge an amendment to the section allowing such societies State stipends, similar to that relating to the State societies which is, that each of said societies shall cause the prohibitory liquor law to be enforced on all grounds over which they have control, and not allow gambling or any games of chance on said grounds. I append a summary of the totals as returned to this office.

ANALYSIS OF EXHIBITIONS.

Number of horses and colts, 2,377; number of thoroughbred bulls and bull calves, 347; number of thoroughbred cows, heifers and heifer calves, 822; number of grade bulls and bull calves, 158; number of grade cows, heifers and heifer calves, 1,028; number of oxen and steers, 2,819; number of animals for beef, 272; number of cattle shown in herds, 779; number of sheep, 1,766; number of swine, 653; number of poultry (coops), 1,178.

ANALYSIS OF AWARDS.

Total awards on live stock, $12,734.93; amount awarded grain and root crops, $1,412.75; amount awarded bread and dairy products, $744.80; amount awarded agricultural implements, $84.25; amount awarded exhibition horses, $3,609.15; amount awarded in trotting purses, $32,678.50; amounts awarded to horses including purses, $36,287.65; total of premiums, purses and gratuities awarded, $53,841.40; per cent of purses to total award, 60 per cent; per cent of stipend, 13 4-25; per cent of increase in awards over 1893, 25 1-2; number of societies receiving stipend, 49; increase from 1893, 3.

At the request of several members I have prepared an itemized statement of the stipends as awarded, also the amounts as they would be, if divided according to the premiums and gratuities with the purses left out.

The attorney general informs me that, in his opinion, a purse is not a premium, according to the intent of this law, but as it has been the custom to class them as such it might be best to have a bill put in to cover the case if it should be thought best.

As there is a tendency to multiply societies, and to take advantage of this method of drawing the stipend in the interests of trotting associations, I call the matter to your attention that you may take such action as you see fit.

In closing my report it is pleasant to be able to say that I think the outlook for our agriculture was never better than to-day. More intensive culture is bringing its beneficial results in increased crops. Diversified farming is making our farms more self-supporting. A more careful study into the problems of feeding is having its effect upon the income from our animals, particularly our cows. By more care and thought in saving our farm manures the waste of soil fertility is being checked; and it is fair to presume that there may be an increase in the net income of our farms in years to come. Respectfully submitted.

At this point the President presented to the Board an invitation from Mr. H. C. Burleigh to visit the State assessors' rooms forthwith. Mr. Skolfield moved that the Board take a recess of fifteen minutes and accept the invitation. This motion was lost, and the messenger instructed to convey the regrets of the Board to Mr. Burleigh.

On motion by Mr. Mooers, voted to accept the report of the Secretary.

Voted. That the Board now listen to the report of the executive committee. This report was presented by Mr. Briggs as follows:

REPORT OF EXECUTIVE COMMITTEE.

BANGOR HOUSE, BANGOR, June 5, 1894.

Meeting of the executive committee of the Board of Agriculture, President A. W. Gilman and Vice President O. Gardner present. Members of the Board to the number of eleven were present. Counties not represented, Cumberland, York and Lincoln. Called to order by President Gilman, who called upon the secretary to state the particular subjects he wished discussed.

Secretary McKeen called the attention of the Board to the matter of cataloguing farms as well as to bogus butter. President Gilman followed, recommending to the Board to do all it could until the meeting of the legislature and then call for funds.

Mr. Hunter of Franklin county said farms were selling better in his county than for fifteen years. He liked the "title." Thought he could not do justice to his county with six hundred words; asked for an extension. Thought the catalogue should be compiled very carefully and had no doubt but that the legislature would aid in the work, if it understood it to be a boom for Maine.

Mr. Richardson of Penobscot county thought the State would not receive much benefit from this matter. Mr. Smith of Washington county thought the State should not be called upon to pay for advertising farms. Mr. Porter of Aroostook county said he had no farms in his county coming under the head of "abandoned." Mr. Skolfield of Sagadahoc county rather opposed the whole scheme. Mr. Mooers of Kennebec county had one in his county. Said farming had changed; more brains must be used *now*. Small farms were being swallowed up by moneyed men; thought the Board would do well to go on with this matter; spoke of the large adulterations in nearly all kinds of food. Mr. Moody of Waldo county said that inasmuch as we came from different sections of the State, each had a different story to tell. He had quite a number of so-called "abandoned" farms in his county and he advised the board to go ahead and follow out the suggestions of the Secretary. Mr. Flint of Somerset, thought no one would farm for a living while good wages could be had at other occupations; a poor encouragement to try to get capital into Maine. Mr. Stetson of Oxford, thought it a good plan to catalogue these farms.

The matter of bogus butter was discussed to some extent, but no action taken. The matter of increasing the circulation of the monthly Crop Bulletin was discussed at some length; no vote taken.

President Harris of the State College, announced the death of Prof. Walter Balentine, and he moved a committee of three be appointed by the Chair to draft proper resolutions upon his death. The motion prevailed and the Chair appointed as follows: President Harris of Orono, L. G. Smith of Pembroke, and T. B. Hunter of Strong.

President Harris explained to the Board the situation and position of the trustees of the college in appointing Prof. W. H. Jordan professor of agriculture at the college.

Adjourned without date.

B. Walker McKeen, *Secretary*.

A. R. Smiley, *Clerk*.

A meeting of the executive committee of the Board was called on Wednesday, September 5th, at State Fair grounds, Lewiston, but no meeting was held and no record made.

PARLORS OF HOTEL WILLOWS,
Farmington, December 4, 1894.

Eight o'clock P. M., meeting of executive committee of the Board. Counties not represented, Androscoggin, Kennebec, Oxford and York. Meeting called to order by President Gilman of Piscataquis county who requested Secretary McKeen to define the particular object of the meeting. Secretary McKeen stated the prime object of the meeting was to get an expression of the Board on the formation of the legislative committee on agriculture. He also stated that there was great need of more money for institutes and office work. The following names on the part of the Senate were suggested as being acceptable to the Board: Wiggin of Aroostook, to be chairman, Ames of Washington, Gordon of Oxford, Savage of Androscoggin and Wood of Kennebec, with a preference for Savage instead of Wood. The following names were suggested on the part of the House: Briggs of Auburn, to be chairman, Gilbert of Greene, Holbrook of Brunswick, Adams of Bowdoin, Comins of Eddington, Parsons of Foxcroft, Hows of New Sharon, Smith of Marion and Farrow of Belmont. Voted the Secretary be authorized and instructed to present the names suggested to the President of the Senate and Speaker of the House.

Voted the Board ask the committee on agriculture for an increase of salary for clerk to the Secretary of Board.

Voted to adjourn without date.

A. R. SMILEY, *Clerk.*

B. W. MCKEEN, *Secretary.*

On motion by Mr. Skolfield same was accepted.

A discussion of the matters presented by the Secretary in his report followed:

MR. SMITH—I was quite well pleased with the report of the Secretary, and there are many suggestions in it that are of great importance to the interest of agriculture that will probably come up for discussion. Among them I will speak of a very few, leaving the many for the other members to take up. First I would like to take up the question of butterine and oleomargarine. I think the Secretary has taken a wise and judicious course in prosecuting those persons, who contrary to the state law, are engaged in the business of selling those imitations of butter, and that he should have the support of the Board. While I am not a full believer in the doctrine that oleomargarine and butterine should be shut out of our markets, I believe that they should not come in as the genuine article, butter, but should be labelled and sold for just what they are, so that no one will be deceived. If they are something which it is necessary for us to have, and which takes the place of butter and is of some advantage to the poorer class of people, I say that those people should have the right and privilege of buying them; but I do object to having them come into our markets to be sold as butter. If they should be labelled and sold for what they are, so that every person that buys them knows that he is buying an imitation of butter and not the genuine article, I should have no objection to their sale. I believe, according to the law of Massachusetts, the manufacturers of oleomargarine and butterine are not allowed to color them so that they look like butter; and when they are not colored they are as white as lard, not desirable to look at, and I do not believe they would sell. If something of that kind could be adopted in this State I think there would be no trouble in getting the oleomargarine and butterine out of our markets.

The next item which I want to speak of is the institute work which has been done throughout the State. I think that in his report the Secretary stated that one hundred and twenty-six institutes had been held during the past three years, and forty-four during the past year, with an average attendance of one hundred and fifty-two. That is quite a fair attendance for these institutes, but it is nothing to what it should be. It is reaching but a small portion of the farmers of Maine. The money is appropriated by the State to hold these institutes with the purpose of developing the farmer and teaching him some way in which he can farm better than he has been doing; and it seems to me that there should be some methods adopted to make the institutes of more interest, and to draw out more people to attend them. It is useless to hold institutes and pay out money to procure speakers to talk to empty walls. I hope this matter can be brought up here and discussed in some way so that more people can be reached and benefited. I believe that institute work is beneficial to the farmer, and I believe that it is our duty as a Board of Agriculture to try to do this work. I have no way to suggest as to how this work should be done, but I believe some action should be taken by the Board in regard to this matter.

I noticed that the matter of farm catalogues was spoken of; but I am utterly opposed to it in the form that has been talked of, for the very reason that I think there is a better way of disposing of abandoned farms than by cataloguing them, and offering them for sale. If we, as a Board of Agriculture, can use our influence in any way to induce some manufacturing in these towns where the abandoned farms are situated, and build up a home market for the produce and products of the farm, I think the question of disposing of abandoned farms will be settled; somebody will want to buy them. I am a great believer in home markets; I think they are the best markets in the world. If we can sell our produce near our homes it is very much cheaper for us than it is to seek a market at a distance, and generally the prices are better. So that it strikes me quite forcibly that if this matter can be brought about—industries built up in our State which will create a demand for the products of our farms—that question will be decided at once.

One other item which I have thought of quite often, and which is quite important, I think, is the matter of the division of the State bounty or stipend. The Secretary has spoken of it in his report, and later on I have a resolution which I wish to offer in regard to it. The stipend has been divided, if I understand the matter rightly, on premiums, purses and gratuities; but I am aware that quite a number of the societies which hold a charter as agricultural societies are running wholly in the interest of horse trotting, and that they offer large premiums, or purses, on horse trotting, and small premiums on farm crops and stock; thereby drawing from the State large amounts to help sustain and support their societies when they are not, in its true sense, agricultural societies. And if I am informed correctly, there are other societies that are now seeking to get a charter, be organized as agricultural societies, for the very reason that they want to get a benefit from the State. It strikes me that that is not doing business on a fair scale. Here is a small society that is doing business on a square basis, offering large premiums for farm crops and farm stock and small purses for horse trotting, seeking to benefit a farming community and encourage and promote the interest of agriculture; whereas a trotting association is simply drawing out a class of men that are interested in horses and that have no particular interest in agriculture in any of its pursuits; they appoint a horse trot, and I am sorry to say in many instances have a jolly good drunk; I know it to be true, (and I say it with shame) of the society to which I belong; and this society which is trying to do a square business and benefit the farmers at large is shut out and only gets a small percentage of the State stipend, while the other society can draw a large portion of it, because it has paid large purses for horse trotting.

I believe it would be proper to seek some other method of dividing the State stipend; and if it would not be out of place at the present time I would like to offer this resolution;—

WHEREAS, It is apparent that the present method of dividing the State stipend is being taken advantage of by societies organized purely in the interests of horse racing, therefore be it

Resolved, That it is the opinion of this Board that section 10 of chapter 58 of the Revised Statutes shall be amended by inserting after the word "societies" in the seventh line of said section the words "Provided that no sums awarded for trotting purses, bicycle races, games of ball or other sports shall be included in the item, amount awarded."

Mr. MOODY—I did not know that I was to speak here this afternoon until I saw it on the program, and of course it is impossible for me to get up here without knowing what I am going to say, and carry on this discussion. I have no intimation as to what subject I am expected to speak upon, so cannot say anything.

This report has been accepted, and that is sufficient for the most part. If there is any portion of it that we want to take up, adopt and put before the committee on agriculture of the legislature, it seems to me that is what we want to get at, and I should be pleased to say something upon any such subjects. I think the Secretary is the proper man to call up to find out if there are any parts of the report that we should take up, and it seems to me that that is the first work we should do, because by adopting the recommendations we can give force to them. I will inquire of the Secretary if there are any such recommendations that need to be taken up in detail and adopted here.

Mr. MCKEEN—There are some matters mentioned in my report that I would like the opinion of the Board on, particularly the law regarding the sale of bogus butter. The present law prohibits the sale of this article, but the matter is left very loosely, so that butterine and oleomargarine are not only sold from stores, but are being peddled all over the State. Wagons are sent out from Lewiston by men who claim to be farmers, and who claim to be selling genuine butter; but it is nothing more than butterine which has been sent from the stores in Lewiston, done up in the ordinary manner of dairy butter. It is bought in that form for butter and eaten as butter. It seems to me that there should be some way of getting at the enforcement of some law to make this article stand on its own merits. My own opinion is that the law is well enough if an amendment could be added so that it shall be made the business of somebody to enforce the law, and that whoever enforces it shall be sure of some pay for so doing.

The next recommendation is one in regard to some action concerning the sale of seed. There is no question in regard to the sale of poor seed. Last year was a daisy or white weed year, and all of our fields were completely covered with this weed. There was an alarming amount and the majority of it came from the seed. Just whether it would be wise to recommend any legislation is a question for the Board to discuss, but it seems to me that the subject is well worthy of attention.

The matter of farm catalogues might be taken up, and the introducing of new ideas into the institutes; and the method of dividing the State stipend is a question which I should be very glad to have you discuss at some length.

Mr. VINTON—If no other member of the Board wishes to speak at this time there is one matter which I should like to talk upon. I want to be heard upon that, and to be heard early.

By the way, before I get to it I will say, it strikes me that the law in regard to bogus butter is very ample now, and it is made the duty of certain parties to prosecute violators of the law. It is the duty of everybody to prosecute criminals, and in addition to that it is made the duty of certain officers. I believe the Secretary of the Board is not one of them, but anybody may move in that direction, and the Secretary has moved and has done excellent work. We are all glad of this and say "Move more, strike right and left!" But the difficulty is that there is no inducement for a man to start out and prosecute. I believe the law provides for a fine of $100, and it strikes me that it would be well to amend the law by adding to that the usual provision, "One-half to the prosecutor." We have a great many laws that are worded in that way.

The objection to that is that it offers an inducement to some one to start out and prosecute somebody; but I admit that there is no danger in regard to those people who are selling soap grease for butter. It seems to me that it would be well to add this provision, and then Mr. McKeen would have some inducement to go out and prosecute, or if he did not do it somebody else would.

But what I wish to talk about is this State stipend. We thought there ought to be some oversight of this stipend, and we voted that there should be; but we got scared over night and the next day took it back again. Other states appoint members of their Board to go out and see that the stipend is properly expended. I confess I do not know what we should do, but I want to call the attention of the Board to this subject because I am convinced now, more than a year ago, that this distribution has come to be a fraud, and that is my objection to it. I prefer, for one, to have it all cut off, rather than to permit a fraud. In this connection I will say that the society which I represent, the Cumberland County Agricultural Society, feel that there must have been a mistake made in our stipend last year. We did not know but what we might be cut down a little, because so many little insignificant societies were stuck on; still as we did so much more business we were in hopes to maintain our stipend. But it was cut down more than $100, and it seems to me there must have been some mistake. If the stipend is awarded upon business done, premiums paid or anything of that kind, of course those who receive the most and pay out the most premiums, have the largest stipend.

Now if you will look at this report a moment you will see that last year the Sagadahoc County Society received a little more stipend than the Cumberland County Society, and yet the Cumberland Society received more than $2,000 and paid out about $3,000 more than the Sagadahoc. I only speak of this in passing.

It has become customary now for little societies to get hooked on for the sake of the stipend. This is done by a little short act, "Be it enacted that such a society shall receive its proportion of the stipend," and the society is stuck on for the purpose of eking out a weakly existence. This stipend is based upon certain figures, and those societies make out these figures; and I am so clearly convinced that they are not honest that I speak of it. You can see that things are not as they might be.

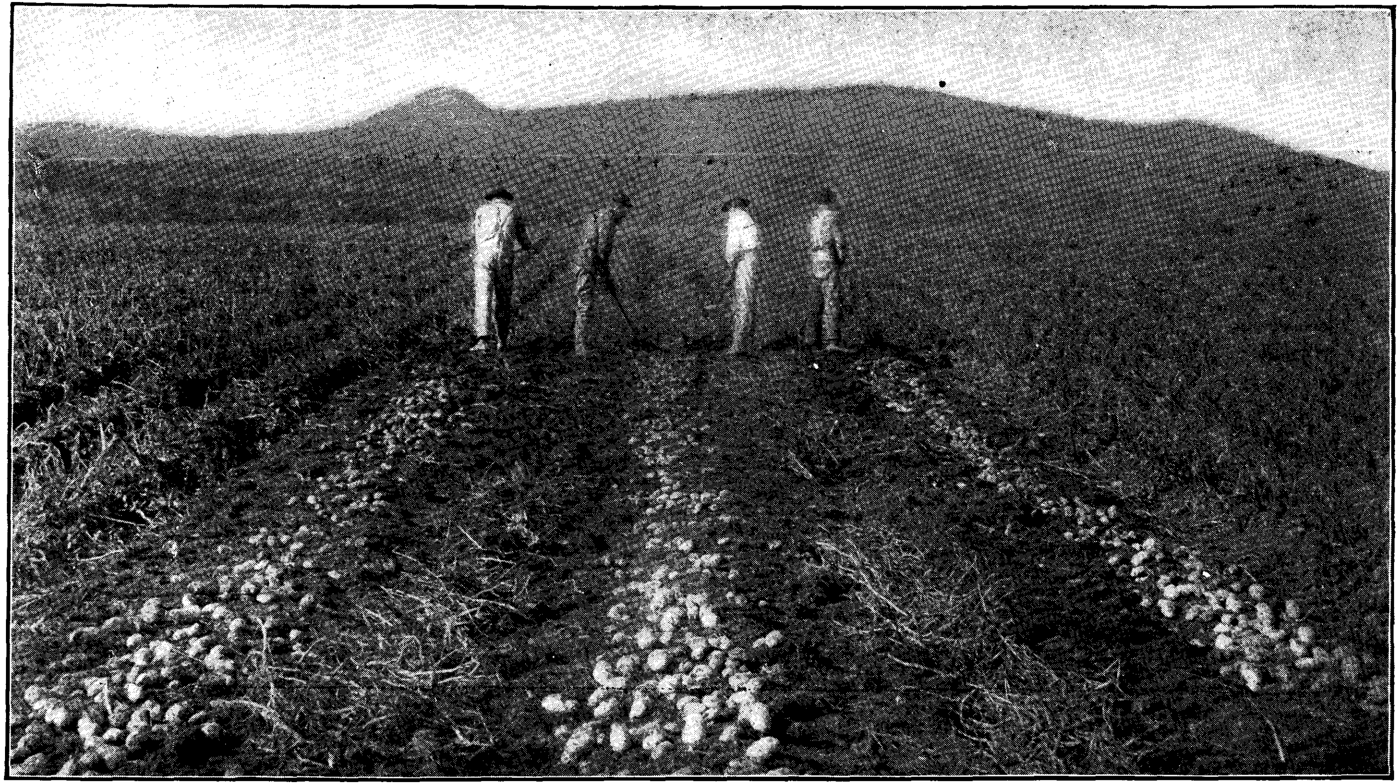
Now for illustration I will look right into my own county. We have in my own town the Cumberland Gray Park Association, that was put on for the purpose of this stipend by an act of the last legislature. It is not an agricultural society at all, but is run by a few gentlemen as a trotting park. It has put on a feature of agriculture, but it is not an agricultural society. It received for a stipend last year more than half as much as our society received. We got $389 and they got $196; and yet when we come to the amount of business, the county society which I represent paid out over $7,000, while that society paid out but a little more than $1,000.

In the northern part of Cumberland county we have a little society, which last fall paid for purses $500, while the society which I represent paid $2,475; and that little insignificant society, doing that amount of business, draws about one-third the stipend that our society does. Now, gentlemen, this is all wrong somehow. This stipend, going out in this way, does not go according to the amount of business done. The same inequality will appear all over the State.

Let us look at another feature;—this stipend originally was supposed to be for the counties; it was not supposed that these little societies were going to multiply and take advantage of it.

Originally the stipend was based upon the population per capita; that was all changed, but still the original idea of having it somewhat equal in the counties was meant to be preserved. But by the multiplication of these little societies the amounts which the different counties receive have been made very unequal. For instance,—the county of York and the county of Cumberland receive about $800; while Washington county receives but $300, and some other counties between $200 and $300. Some small county, on account of these numerous little societies, will receive four times as much of the stipend as some other county of equal or larger size.

I have brought this matter up, but I do not know as we are wise enough to remedy it. I don't know that I can suggest a remedy, but I think a law might be enacted that no society shall receive a stipend unless it covers a certain amount of territory. I don't know as that would solve the difficulty, or that we could get it through the legislature. Another thing I thought of would be to distribute it per capita,—for instance, enact that no society shall receive any stipend unless its boundaries are clearly defined in its act of corporation; then provide that the bounty shall be distributed according to the population, so much per capita



POTATO FIELD OF JOHN W. DUDLEY, CASTLE HILL, AROOSTOOK COUNTY, ME.

whether the society includes one town or twenty. I do not know how that would work, but it does seem to me that some way should be devised by which there could be a more just distribution of the stipend. I represent the Cumberland county society, which is a pretty strong society and does a great deal of business; and I must confess that I come here to enter a protest upon this matter of stipend. When a little society that does not do more than $1,000 worth of business draws more than one-half the stipend that our society, which does $7,000 worth of business, does, I submit to you that that is all wrong. This stipend helps us out, but I would vote to-day to cut it off entirely rather than to have it distributed as it is now.

In regard to the resolution of Brother Smith, I should want to look at that a little. The horse industry is an industry of our State and it is quite an important one. When we come to the matter of fairs, we cannot get along without it. We may cry out as much as we want to, and say it is all wrong, but the vast majority of men and women who go to fairs go to see the horse races. They may deny it, but it is true for all that.

I went down to Providence one year to see the great Narragansett fair. That society started out and made a track and spent a great deal of money for horse trots, but they broke down and failed absolutely. Then they said "Let us turn this into an agricultural fair, and get some cows, hogs and sheep and get it to running." They had the finest exhibition of sheep that I have seen, but any of our little town shows could beat them on cows and oxen. I noticed that they furnished hay and straw for their cattle but not for the horses. I said "Is not that reversing the rule? If you furnish for but one, why not for the horses?" They said "The horses will come anyway, but we cannot get the cattle, sheep and hogs here unless we offer inducements."

They found that they could not have a show unless they had horse trots. They said that even the ministers, who preached against them when they were running a horse trot simply, would come and sit from two o'clock until dark to see the races. We cannot get along in our fairs without the horse, and without giving very much prominence to the horse; and it is worthy of remark in regard to these purses which we pay for horses, that the five per cent which must be paid in order to enter the races, and the five per cent which we deduct from winners, brings quite a large portion of that back.

Mr. Smith—This resolution does not in any way shut out horse trotting from fairs. The horse is so well established that he can take care of himself; and you have the right to offer as large purses as you wish for horse trotting, but the stipend is not based on that at all. It is based on the premiums paid for farm crops and farm produce, outside of purses. Thus societies organized almost wholly for the purpose of horse trotting would get less of the State stipend, according to this resolution. According to this method of dividing the stipend nineteen societies would receive more, and twenty-one societies would receive less. That is the relative difference. The largest amount paid would be $156.98, and the smallest amount, $95.35.

Mr. McKeen—I wish to make a little explanation. I fully agree, personally, with the main points which Mr. Vinton has brought out in this matter. I think there may be a better way of distributing the State stipend, although I would not be in favor of bringing into prominence the county lines again.

The law regulating the stipend provides that there shall be paid annually from the State treasury a sum of money not exceeding one cent to each inhabitant of the State, to be divided among agricultural societies not otherwise provided for by law, according to the amount of premiums and gratuities awarded. I submitted to the attorney general the meaning of the word awarded; as to whether a society could award $10,000 and scale that down fifty per cent, and then claim the proportion of the stipend for the $10,000. He gave me as his decision that it was evidently the purpose of the law that the stipend should be according to the amount of premiums and gratuities *paid*. I have the original sheets on which the figures have been made for three years. (Figures given for Cumberland and Sagadahoc county societies.)

As I understood it, Mr. Vinton, your discrepancy was between '92 and '93. In 1892 the Cumberland County Society paid out $2,941, and in 1893 $2,473.25, according to the blank returned; a reduction in 1893, you will see, of between four and five hundred dollars. And by the addition of other societies, and by an excess of the amounts of premiums and purses awarded in some societies the per cent had been reduced, which caused a further reduction.

There has been an increase in the amounts of premiums and gratuities this year, so that the society will receive $450, as against $389 last year.

Mr. VINTON—I have entirely new light now. I should say the mistake must have been in the returns from our society. Our secretary probably has not returned the amount of business done.

But my point still remains untouched. There is a wide open door for some to send figures here which do not represent the true state of the case. I am clearly convinced that the returns which are made to the secretary do not represent the true amount of business done in the various societies.

Prof. JORDAN—The Secretary has made some important recommendations in his report, and a good many good things have been said about it; but in order to make any recommendation effective it is necessary to organize some means of doing so. I do not know but I am forward in presenting the motion which I wish to make, but I have no constituency and shall not have to be responsible to anybody. I desire to make this motion,—that the Board appoint a committee of three, to be known as a committee on legislation, which shall consider the Secretary's report in relation to the sale of bogus butter, the payment of stipends to agricultural societies, the matter of gambling at fairs and the sale of impure seeds, and present to the committee on agriculture a request for the legislation which is needed.

This motion carried; also voted, that the committee be appointed by the chair, the appointment to be made later.

Mr. SKOLFIELD—I would like to ask the Secretary whether he has made any computation by which he can tell how large a percentage of what has been paid for purses has been received back.

Mr. McKEEN—I have never done so, because there is no way in which I can take that into account in distributing the state stipend. I have never tabulated it, but I could get at it in a little time.

Mr. MOODY—I do not understand what the gentleman means by "paid back."

Mr. SKOLFIELD—Trotting horses are not allowed to go on the track unless they pay a percentage.

Mr. VINTON—In our society in Cumberland county, when we come to reckon the amount that we have actually paid out, we find that we have paid a great deal more for cattle, sheep, hogs and agricultural products, than we have for horses.

Mr. Moody—I would say that I have had something to do with horse trotting for quite a good many years, and I think the rule would hold good that more than fifty per cent is paid back. You see six entries pays fifty per cent of the purses, and sixteen entries pays one hundred per cent.

Mr. Smith—It is due that some action be taken on this resolution which has been presented, and we have taken no action upon it.

Mr. Moody—This is an important resolution, and one that would involve an endless discussion if we should take it up at this time. It strikes me that it would be well to lay this resolution on the table until 9 o'clock to-morrow morning. And in the meantime we could think and talk the matter over. That looks to me to be the most feasible way, therefore I move that this resolution be laid upon the table until 9 o'clock to-morrow morning. This motion submitted and carried.

Prof. Jordan—I would like to offer an amendment to be included with this resolution; which is that in place of the words "Provided that no sums awarded for trotting purses, bicycle races, games of ball or other sports shall be included in the item, 'amount awarded,'" the words "Provided that the stipend shall hereafter be based entirely upon the premiums and gratuities awarded on exhibition stocks and products" be inserted.

My reason for offering this amendment is that the present form antagonizes certain things, while the form which I offer does not call anything by name to antagonize it, but simply designates what *shall* be taken upon which to base the awards, not what shall *not* be taken.

On motion by Mr. Vinton this amendment was placed upon the table, with the resolution, until 9 o'clock Thursday morning.

Mr. Twitchell—I have listened with a great deal of interest to the discussion of the past hour, because it seems to me that you are discussing one of the most vital questions on which the Board can take action. The question of stipends, as a means of encouraging and strengthening agricultural exhibitions is a matter of a great deal of importance to the counties of the State. If, through the multiplication of agricultural societies, and the increase in purses, premiums and gratuities, that sum has to be divided until it becomes of little or no account then the effect will be lost. The sum, in order to stimulate and strengthen an agricultural society, must be of sufficient size to warrant some effort on the part of the officers and members of that society; and so I say that it seems to me that in the multiplication of societies, there being now forty-nine drawing from the treasury and more to come, the only safeguard under the present law would be in the legislature: and as has been manifest for the past several years, there seems to be no question on the part of the members of that body,—they grant freely petitions which come up in behalf of agricultural societies to be made beneficiaries under the act of corporation. So we have six or seven societies in York county, five or six in Oxford county, and so on scattered over the State. I have long been a believer that it would be better for the State and better for our agricultural societies of the State if the stipend was based entirely upon the premiums and gratuities. I think that we should find in a very few years, or in the first year, that there would be an approach to an equalization when we struck out the item which is paid for purses. I remember that in looking over the returns one year I noticed that the amount received for entry fees and deducted for purses amounted on the average to fifty or fifty-five per cent. It seems as though the item of purses might be taken out of the account and the stipend based entirely upon the premiums and gratuities, and that would remedy the evil, and strengthen nearly every society that is paying premiums of any amount.

You will notice by the sheet which the Secretary has prepared that Aroostook, Androscoggin, Kennebec, Penobscot and Washington counties would all be strengthened in their stipend if you took out the purses; while Cumberland, Hancock, Piscataquis, Waldo and York would lose. Those societies which are to-day giving the largest premiums, with the exception of Cumberland, would be helped if they could be relieved of the purses; and the others would be losers until they had offered more. And is it not a fact that in offering more for stock and products you are offering the encouragement which that stipend should offer?

So the question becomes one of the most important questions for you to consider, and a question in the settlement of which good will come to the agricultural societies.

One point which the Secretary touches upon in his report must commend itself to each and every one of us as citizens, and to you as members of the Board, and that is his recommendation for some legislation which will enable him to withhold the stipend from agricultural societies which admit gambling and games of chance at their fairs. And we want to carry it a little farther: anything and everything which would lower the character of our agricultural work and bring into disrepute our exhibitions should be driven out; and it seems to me that one of the best ways to do this is to make it obligatory upon the Secretary to withhold the stipend from those societies that admit of such things. Then we shall make our societies what it is desired they should be,—helpful and affording entertainment and amusement for our wives and families.

Mr. VINTON—I agree entirely with what Mr. Twitchell has said, and yet I do not overlook the fact that all the people who go to agricultural fairs are not angels. Anything that is forbidden by law is cut off by itself. I only wish to say this,—if you empower or direct the Secretary to withhold the stipend for this thing or that thing which is deemed objectionable, it would be quite likely to involve us in a vast amount of difficulty on this ground; there are always a certain number of persons, men and women, perhaps more women than men, around in all these fairs that are continually watching to keep the world purified; and they do not think they are doing their duty unless they find something to find fault with. And the difficulty would be that some of these people would hop up and say, such a society permitted this thing or that thing and therefore you must withhold the stipend. Then of course the stipend would be withheld and the society must contrive in some way to get that stipend back; which would involve a hearing, and the officers of the society would come forward and say "We have not permitted anything of this kind; we told everybody not to admit it, and we deny that it was there." If these people had happened to see somebody with a bag of candy that had a prize in it, or something of that sort, these officers would say "We did not permit that, somebody smuggled it in." Unless we are pretty careful in this matter we shall be quite likely to involve these societies in a great deal of trouble.

If we could run these societies as we run the State Fair of course that would be wise; but when a society has a clean Board of trustees, who are just as much impressed with the law and the gospel of these things as men can be, and strive, watch and labor to keep everything out that is objectionable, and then somebody,—perhaps an evil minded person or perhaps an honest one,—starts up and says "That is wrong" and interviews the Secretary, the society will be involved in a great deal of trouble unnecessarily. The only difficulty that I see is this open door.

Mr. Twitchell—I realize that to carry the thought as far as Mr. Vinton does would open that objection. But if we base the law upon pool selling, gambling or games of chance so that it shall read just as the law reads in regard to the State societies I think there would be no difficulty. One county society was reported last fall as selling pools; but the officers said that the building in which the fair was held was owned by a private individual, so that they could not prevent the pool selling. But the law in regard to the State societies is so framed that the societies are expected to have jurisdiction over the building. I would not make any suggestion that you carry the legislation beyond the provision for the State societies; but I wish that every society could be put upon the same basis as the State societies.

Mr. Moody—I wish to say a word in regard to a matter presented by the executive committee in their report, an increase of salary for the clerk to the Secretary of the Board. It seems to me that if we have a clerk here we out to pay him, and that he is entitled to the amount which any clerk would receive who does the same amount of work All the salaries in this House have been increased steadily for the past twenty-five years; the salary of the Secretary of the Board of Agriculture has been raised from $600 to $1,500 a year, while the clerk receives but $500.

In order to bring this matter before the Board I will make a motion that the Secretary of this Board be instructed to ask the committee on agriculture for an appropriation of $1,000 for a clerk hired for this department.

Voted, That the Secretary be so instructed.

The chair announces that the committee on legislation is as follows: W. H. Moody, Waldo county; F. H. Mooers, Kennebec county; E. E. Light, Knox county. The report of this committee is to be made to the executive committee of the Board.

On motion by Mr. Skolfield adjourned until 9 o'clock Thursday morning.

THURSDAY, January 17, 1895.

Meeting called to order by the President.

Record of preceding day's meetings read by the Secretary.

Report of committee on pay roll was presented and accepted.

MEMORIAL EXERCISES.

Resolution on the death of Mr. B. F. Pease, read by Mr. W. H. Vinton, of Cumberland.

Hon. B. F. Pease was born in Cornish, November 17, 1823, on the farm upon which he lived all his days, with the exception of about a year, and upon which he died.

Of course it is not vouchsafed to any of us to know much of his inner, domestic life, or to be judge of his intercourse with his neighbors. But many things which we do not know may be safely predicted of the things which we do know. We knew him here, and we saw him in the busy throng and in the market place where men most do congregate; and we know that his genial smile and the noble traits of character which he exhibited here and there, when transferred to the home circle could in no event fail to make him a model husband and father, and that his intercourse with his neighbors must have been without shadow, cloud or storm, and here is where the true merit of every man is found.

He was much in public life. There is scarcely an office of trust and responsibility in his town, which at some time he did not fill, being for many years one of its selectmen. He was the first Master of Cornish Grange, in which he never failed to take great interest. He was for eight years one of the county commissioners of York county.

He was largely instrumental in organizing the Ossipee Valley Agricultural Society, and was its president for sixteen years. He was for three years a member of the board of managers of the Maine Experiment Station, and was twice elected a member of the State Board of Agriculture. And in the discharge of the multifarious duties of all these several offices the most carping critic could discover neither blot or stain.

He early adopted agriculture as his life work, and to which he adhered under all circumstances, without deviation or shadow of a turn. He accepted it with all its conditions, and shared liberally in its rewards. He was a model and enthusiastic farmer; his broad acres and well shaven fields were ever to him an inspiration. When he came back after a year's absence, as before stated, and settled for life upon the home farm, it cut then less than twenty tons of hay; when he died it cut one hundred tons, as the result of his wisdom and labor. He was one of the few farmers who never believed in the heresy of permitting oxen to depart from the farm, and to his last surviving day was a large breeder and owner of oxen. He was ever an ardent admirer of nature. The fields, the flowers, the fruits were his daily solace; the sunshine and storm were both alike his instructors. He never tired in his admiration of his native hills, among which he now sleeps, and which will in turn so fitly stand guard around his resting place forever.

"Light be the turf above him,
Friend of our early days;
None knew him but to love him,
None named him but to praise."

I may not close these remarks without a brief allusion to the large list of mortality which has occurred among the members of the Board since my brief connection with it: One from Franklin, one from Kennebec, one from Lincoln, one from the State College, two from Penobscot, one from Washington, and now we come to add the member from York.

There is probably no explanation for so large a rate in a body so small, and it were doubtless idle to attempt any. Still it may properly be said that membership here does not go by favor, and still less so by purchase, but is won by patient toil and experience over many years, upon the farm, or in some department of agriculture; so that ordinarily the members would be likely to be somewhat advanced in years, and hence might be somewhat broken in physical constitution. Whether this be any explanation or not, one thing is certain, these were all men of ripe experience, sound judgment, wise counsellors, and who served their several constituencies with great fidelity and fell, at last, standing manfully at their posts, and were gathered in like shocks of corn fully ripe for the harvest.

Resolved, That in the death of Hon. B. F. Pease, of Cornish, member of this Board from York county, who has deceased during the past year, this Board is deeply sensible of its loss.

Resolved, That we mingle our sorrow with that of the family of our deceased associate in the death of its honored head, with the citizens of Cornish in the removal of one whom they had learned so well to honor and respect, with the Ossipee Valley Agricultural Society in the loss of one so prominent in its creation and so long and so faithfully identified with its interests, with the agricultural societies of York county in the loss of their honored member and faithful representative on this Board.

Prof. JORDAN—The fact that I had relations with Mr. Pease for three years makes it fitting that I should say a few words here. I simply wish to speak of one characteristic, which, though quite common, yet is altogether too rare in the citizens of this or any other state. Mr. Pease was a man of a single purpose, markedly so; the only question he asked when any matter of business came before the Board or the managers of the Maine Experiment Station, or any question of public policy was broached, was "What is right?" No motives of policy apart from the firm principles of right moved him. He moved steadily on in his work, so far as I had a chance to observe him, believing in right and believing in loyalty to right. I think, gentlemen, I might talk to you for half an hour and say nothing which could be a greater encomium on any man than what I have already said.

Mr. L. O. STRAW—It may be my duty to say a word in behalf of Brother Pease, although most of you may have had a more intimate acquaintance with him than I have. I have never met Brother Pease in active business life, and I think I have met him but twice in public meetings.

He lived some twelve miles from my home, and as I am young in agricultural work, so to speak, I never came very closely in contact with him. I have been led to believe, however, that he was a man of strict integrity,—a man the warp and woof of whose life were exceedingly full of merit. He was a very decided man in all his work and a very successful farmer. His soul was wrapt up in his farm; and he was a dear lover of stock. He came to Cornish years ago and began farming on a small farm, and to-day, as I am pretty well assured, his farm numbers some 500 acres. He owned more farms through that section than any other man.

He was a man to whom the people of Cornish always went for counsel; he was a grand counsellor. When any matter came before the town that needed a word that would come very near the word of a lawyer, Brother Pease was the man to whom they always resorted; and he was incessant in his efforts to bring about that which was right,—ever interested in his town. I feel that it is almost impossible for me in my weak way to succeed such a man.

It makes me, if I may so state it, a little weak kneed. For I do think that we have no such a man in York county, a man so thoroughly interested in the agricultural pursuits of the day.

On motion by Mr. Wheeler, voted that these remarks be spread upon the journal and the report, and that suitable marked copies be sent to the family of the deceased.

The following resolution was now read by Mr. Smith, President of the Board:

Resolved, That in the death of Prof. Walter Balentine this Board has lost a wise and faithful member, and the cause of agriculture an earnest and cultured teacher.

Prof. JORDAN—It could hardly be otherwise than in speaking of Prof. Balentine it would be evident to you all that I am speaking of a personal friend. I knew Prof. Balentine as a student in the Maine State College; I entered there in 1872, and he was then a member of the sophomore class. That acquaintance continued until his death, last February; and as students, as officials in the Maine Experiment Station and as members of the working force of the Maine State College, we were thrown into close and intimate contact. And so what I may say to you this morning about Prof. Balentine will be said from the experience of one who knew him well.

As a student in college Prof. Balentine was popular among his fellows. He was not popular in the sense of one who catered to all that was evil and loose in college life, as is sometimes the case; but he was popular because there was in his attitude toward every student that friendly, helpful relation that should always exist. And it is significant that the friendships which began in the Maine State College as students were friendships that continued and strengthened as long as he lived. Prof. Balentine, while a quiet student, was an ambitious student; he was at the college for the purpose of fitting himself to do a work. We have too many students who are there because they are sent there; but Prof. Balentine was there because he went there to fit himself for a life work. I want to say a word about what he did in order to fit himself for this work. About the time that he graduated at the State College Professor Atwater of Middleton, Conn., was a teacher there for a short time. He afterwards went to Connecticut and was instrumental in establishing the first experiment station in the United States. He became its director, and selected Professor

Balentine (he knew him as a senior) as one whom he would ask to go there as an assistant, because of what he knew of his sterling qualities and earnest purpose; and Professor Balentine was at Middleton, Conn., as an assistant of the first experiment station in the United States, for a period of about two years. While there he became convinced of what must be done in order to fit himself for successful work along that line, and so he went to Germany, which was then, as it is now to some extent, the nectar of all students of agricultural science, and spent two years there in further preparation for the work that he had chosen; one year in the University of Glasgow, and another year as assistant in the experiment station at Harvre. Then Professor Balentine returned to this country and was connected for a time with the work of the Department of Agriculture in the investigation of sugar problems, and afterwards became the first full Professor of Agriculture at the Maine State College.

Now I want to say just a word aside here. Professor Balentine's efforts to fit himself for his work were no exception to what is necessary for successful workers along lines of science related to agriculture. He appreciated what all men must appreciate who look into the matter carefully, that there is no line of work along any industrial pursuit demanding of a man a more complete and thorough scientific training, and a broader knowledge of facts than the line of work which he chose. He showed his wisdom,—wisdom that many young men lack, in fitting himself thoroughly for his work before entering upon it.

As a teacher at the Maine State College, I refer now to his relation to the students, Prof. Balentine was popular first of all because he was well informed; and second, because he succeeded in establishing the right relation between himself and his pupils. Every student of the Maine State College felt to go to him for advice and consultation, and they found sympathy and help. As a teacher outside the college Prof. Balentine was a man of somewhat quiet habit, a man not much given to pyrotechnics in his methods of treating his subjects, or of treating his audiences; but he was eminently a sane teacher. You know, gentlemen, there has been a tremendous call on the part of the public for results from experiment stations, and men engaged in lines of work affecting agriculture. We have had a great deal of money appropriated for work of that kind, and the public has asked for results. Prof. Balentine was a man who never allowed himself, for the sake of public favor, for currying favor along the line of his work, to go beyond what he considered facts would allow him to state. He held himself closely within observed and well known facts, somewhat to his injury sometimes. The man who does that will suffer for it, but that was eminently characteristic of Prof. Balentine.

I come now to speak briefly of his social relations. It was peculiarly characteristic of him that he was charitable in his judgments; he endeavored to put himself in the other man's place. More than that,—if you were to go into his room to sit down with him for a quiet talk, gossip was not one of the things in which he dealt. He was very slow to speak ill of another; in his judgments of others he took a judicial attitude. More than that, he was a faithful friend. He was loyal to his friends and to the institution with which he was connected; unselfish in his relation to the institute. The Maine State College has had a great variety of experiences in its relation with the public and in its internal management, but I can remember no instance in my long acquaintance with Prof. Balentine when he did not put the interests of the institution and of the agriculture of the State ahead of his own interests. I say he was a faithful friend,—let me give a bit of personal experience. When I was asked to come from the state of Pennsylvania and take charge of the Maine Experiment Station Professor Balentine was one of the managers. He had known me in college, and had known considerable of me since I graduated from college, and he knew my failings. I was his guest on my first visit to the college when I went there to look the ground over and decide whether I would take charge of the station or not. After dinner one day he called me into his s udy,—into his den as he called it,—and said "Jordan, I want to have a talk with you; I know you pretty well and you know me pretty well." And so he sat down and looked me in the face and told me some things that I must not do,—that were failings of mine,—if I were coming to the State of Maine to take charge of the Maine Experiment Station. He told me frankly, plainly and kindly, and that sort of friendly faithfulness I appreciated. I have known of his doing the same thing with other friends. He had the courage and the loyal interest that not only moved him but enabled him to go to a friend and set him right.

There is only one other relation in which we might speak of Professor Balentine this morning, and that is in his home relation. His home was one of the happiest homes in the State of Maine.

More than that it is not necessary for me to say. The sacredness that pertains to the home life should not be very largely intrenched upon. Those of us who are left at the college have missed Professor Balentine sorely; we have missed him as an adviser, we have missed him as a friend.

On motion by Mr. Skolfield, of Sagadahoc, voted that the resolution be adopted, placed on record, and a copy sent to the family of the deceased.

The resolution presented by Mr. Smith, and laid upon the table in the Wednesday afternoon session, was now called up, and on motion by Mr. Moody, voted that the amendment to the same offered by Professor Jordan, be adopted.

A motion to adopt the resolution as amended was followed by a discussion of some length.

Mr. VINTON—There is more in this matter than we might suppose. The simple proposition as it appears upon the paper, is to make a change in the law; but the design of it is to affect the horse department as it appears upon our fair grounds in some degree, although not very seriously. There is no prohibition, it does not affect the management of any fair in offering purses, but it does affect the fairs after they have offered their purses, paid them out in good faith. When they receive the stipend which the law allows the fairs, it will be apportioned not at all upon what they have done in the horse department, but wholly upon premiums offered for such articles and animals as appear for exhibition. I have a very strong impression that this resolution is right, and the more I think of it the more I am impressed with the wisdom of it; and I do not see that the horsemen can take exception to it, but my experience in fairs goes to show that the horsemen are a very peculiar class of men. They are there for the special purpose of looking out for the horse, and the men who are interested in the running of fairs must take notice of that fact. We have to cater to horsemen a great deal, away out to the very verge of all patience, and we sometimes get out of patience.

Now we want to go carefully and give the matter due consideration, and I want to make a suggestion. Granted that all of us are in favor just now of adopting this resolution. There are three or four matters which came up yesterday in the report of the Secretary which demand legislation, demand some change in existing statutes or some new statute to be enacted, and we have referred all these matters to a committee which we have chosen.

We have made it the duty of this committee to examine all of these propositions and to confer with the committee on agriculture and through that committee make known to the legislature what the Board desires. Is not this another matter in exactly the same line and requiring the same work? and would it not be wise to refer this matter to our committee on legislation also, and let them consider it with the others and make such recommendation to the committee on agriculture as they may deem best and through that committee reach the legislature upon this matter as well as upon the others?

Mr. SMITH—If the resolution is adopted by the Board then it can be referred to the committee on legislation; but if it is not adopted by the Board no further action can be taken upon it. I want to say a word at this time as to my reasons for offering it. I did not offer it because I wish to exclude horse trotting from our agricultural societies. I believe the horse department is so well established in all agricultural societies that we cannot throw it out, it is able to take care of itself. But this fact does exist and will exist; associations are formed wholly in the interests of horse trotting, and they do not always prove a success and they like to get all the money possible to pay bills with, so they say "We will get a charter and organize as an agricultural society, and have a chance to get a portion of the State stipend." So they organize an agricultural society when their only interest is in horse trotting, and their idea is to get some money. I thought if this resolution were adopted and we got an act of legislation so that the stipend could be divided in the way indicated, it would not really injure horse trotting, but it would prevent those societies from coming up and asking for a charter. In my own county we have two of those associations, which want a charter for an agricultural society. They can offer $1,000 or $2,000 in purses and get a portion of the State stipend; and societies that are already organized and paying small purses and quite large premiums on farm crops and farm stock get but a small amount from the State in comparison with what the trotting associations get.

I thought if the law could be changed in this way it would really injure nobody, and would benefit quite a number of the societies now doing business. I thought it would be a right and just thing, and I hope it may prevail.

Mr. STRAW—I am fully in accord with this resolution, and the amendment; I think it would be wise to adopt it. I have had more or less to do with our agricultural society, and I have always found that the horse department would take care of itself, as has been suggested; there is no trouble about that, and the better purses you offer the better horses you get. Although it may be that we derive our benefits in the main because of the horse feature of our fairs, it does seem to me that that is not the part of it that we should encourage. It is the agricultural part, the producing of stock of various kinds and of vegetables of all kinds that we should encourage. Will it not be an incentive to people to work more largely for the production of stock,—and better stock, and better vegetables, if the stipend is based on premiums offered for these? It seems to me that we should neglect somewhat the horse department from the fact that everybody is interested in horse racing. As a rule ninety-five per cent of the people who attend fairs go for the horse racing,—it is that that keeps up the fair; and it keeps up the fair from the fact that the other part is sadly neglected. I thoroughly believe in this resolution, and believe that if it is adopted and the law changed, it will be an incentive to our people to work more largely in the interests of agriculture and the production of better stock.

Mr. McKeen—I would like to say just a word in regard to the tables of premiums as I have them figured, from the figures that have been sent me, which will show to our Board that no department of our premium list is more sadly neglected than the department of exhibition horses. These tables show only $3659.16 paid for exhibition horses, including all the various classes of horses, trotting stock, etc., whereas $6738 went for purses alone; $1412 was paid for grain and root crops, and $744 for bread and dairy products. Dairying has become, as we all know, quite an important industry in the State, and it seems to me that the encouragement of the premium side of the fairs would be a great assistance, because by so doing we should build up the premiums that are offered on bread and dairy products, as well as on agricultural implements, grain and root crops, and on our exhibition stocks, which latter would go quite largely to horses because the amount now awarded for exhibition horses is the smallest in proportion to the animals exhibited. The stipend is now .1332 on a dollar but under the proposed system it would probably be thirty cents or more on a dollar; so you see that would be quite a source of encouragement for the offering of larger amounts in premiums on our exhibition stocks and products.

Mr. Moody—While it might seem to be an irreconcilable statement, it is a fact and there never was a truer one, that the greatest errors have been made in shaping legislation by an array of facts or figures. Pope says,

"In spite of pride, in erring reason's spite,
One truth is clear,—whatever is, is right."

He means that whatever exists and continues to exist, is right. You study that over, if you have not, by day and by night, and you will find it to be a fact.

Now, I am not a horse trotting man,—never owned a trotting horse and never shall,—but I have been connected with fairs and horse trots for quite a number of years; and I have been a farmer for twenty-seven years. While I have not farmed on 500 acres I think I have had quite as hard experiences on a few acres as the man has who has had a good many. The horse business has increased very largely in the State of Maine (to say nothing of other states) within the last twenty-five years; and it is safe to say that it has brought more money into the pockets of the farmers in the State of Maine than any other one industry connected with the farm. This is a fact, and what is the real difference whether a man makes his money on a horse or on an ox? I do not want to dictate to you whether you shall keep horses or oxen, but I submit to you that a man has just as good a right to keep horses as to keep other stock, and that this business is worthy of just as much encouragement as the raising of oxen, sheep and cows; and you will see by the progress in the horse business that the people believe it, too. You can safely rest the horse business with the man who is running it; he knows that it is his own private business and touches his pocket, and he is looking after it closely. This fact makes me think there is some money in the horse business, and therefore I want us to be very careful how we vote for what may seemingly be an effort to crush the horse business, and antagonize it. The horse men in this State are legion, and their influence is large. If we want to have an influence in the State we must be careful how we use it.

Let us look at another point. Of course you understand that you cannot carry this proposition; we are putting ourselves on record as being in favor of a certain thing, but I do not suppose for a minute that the committee on agriculture will frame any such a bill. But supposing the proposition should be carried, let us see whether or not we are right in our premises. You say you want to change this law and give the premiums to exhibition stocks and products wholly. Now I will take my own fair: We offered in the first place a small, reasonable premium for exhibition stocks of all kinds, and we never got much of an exhibit; but the people kept saying, "Why don't you give something? Why don't you offer some premiums and then you will get something." I said, "Let us offer larger premiums and stop this talk." And so we offered ten dollars for the best cow, which is quite a good premium for a little country place, and we gave premiums to correspond on all other kinds of stock. And we advertised well and hoped that we should get a large exhibition. We advertised that we would provide food and shelter and straw for the stock and would take care of it, and we got six cows! One year I went to work to get up an exhibition in the hall, and put a good deal of time into it. I went around from house to house as of course I knew the people all round about, and urged them to bring in something for the exhibition. I filled the hall, and we had a good exhibition and thought we had got the thing going; but the next year I was secretary of the track and could not make this canvass. We put a man in to do it and the result was we only had six articles in the hall. Now you see we may perhaps pay out one hundred dollars in premiums upon our exhibition stock and products and what are we going to get? Lay aside the horse trotting and what we get from the State and our entrance fee would not pay the premiums; and that would be exactly the condition of things with all of our small fairs. The large exhibitions would draw all the more,—"To every one that hath shall be given" but the fellow that hasn't got anything will not get anything. You are not encouraging the small fairs, but are killing them; and that is not what you want to do, I know. The large exhibitions of course are all right, the more the small ones lose the more they will get. They can afford to run, they are making money; but we are dead. I am just stating what I believe; and I feel so confident that there is not a doubt in my mind, that we could not run a fair of any kind if it were not for the horse trots. We take the money from our June and August races and pay up our premiums. We get so much at our fair and we pay out so much (a larger figure) and still we are not in debt. I have wondered how the Secretary figured that out; we get the money at our June and August races. I do not know but we shall drop out the fair, even if we lose the State stipend, as we get nothing from the fair. We do not need the stipend to pay our purses. Last year we had sixteen paid up entries in one class, and ten and eleven in the other classes, and so we were not dependent upon anybody; but when we came to the fair we had nothing. I do not know how many fairs there are in the State of Maine like ours, but I am telling you the facts about ours. And taking these facts, I cannot see how this amendment would benefit the small fairs, and I feel sure it would be the means of killing them. I have no special interest in what we do here, because it would take a tremendous pressure to get the amendment through the legislature, but I want us to be careful when we go on record that we can back up our record.

Mr. STRAW—As the proposed amendment does not exclude colts and horses, and all that class of stock, from our exhibitions but strikes particularly at the horse trotting people, I see no way in which it would be detrimental to the production of good colts and good horses; and it seems to me that we would be better off to let the horse trotting feature take care of itself.

Mr. VINTON—By this method of dividing the State stipend our society would be one that would lose considerably; in other words we are in the habit of offering large purses for trotting horses. But I do not care for that if it only affects the cause of agriculture well. If this amendment will cut off what Brother Smith wants cut off, I think we should all vote for it.

If a society which is organized and run wholly in the interests of horse trotting should, for fear it would not be able to draw a crowd, put on a side show and call it agriculture, get incorporated and get a stipend, so that the stipend is paid out simply and solely to the horse men,—of course none of us would believe in that. But suppose this amendment is adopted, just what does it do? We arrange our list upon the basis of this amendment and offer premiums for everything that is upon exhibition,—cattle, sheep, hogs, horses, mares, colts, etc., and we offer purses of course, we cannot get along without horse racing; but we must recollect that when the stipend is paid we are not going to get anything back for what we have offered for purses. Now the natural tendency, of course, is to offer more for exhibition stocks and products and less for purses, because our stipend has to be based upon premiums paid for what is exhibited. The question come to me. What do we want to encourage in a horse? This method does not encourage speed in any form, but simply encourages horses for exhibition. A word upon speed as an element of value: We pride ourselves, in the State of Maine, upon our fine horses, and are glad when Bishop from New York or some other man comes and buys a great many of our horses and takes them away. If you raise a gentleman's driving horse, good style, good weight and good character, some of these men will come after him and pay you a good price; but this matter of speed is a controlling feature of the whole business. You cannot find a man to-day who wants to purchase a gentleman's driving horse, who is willing to put any money into a horse if somebody else is coming along behind him and will get the dust off his coat tail. We have more fine gentlemen's driving horses in Portland than in any other place in Maine, but no one is willing to put a dollar into a horse unless his speed is away down below three minutes, no matter how much he will weigh or can pull. It is the single matter of speed that brings the horse men here. Say what you will, speed is the leading and controlling feature of the value of horses in Maine to-day. If you raise a horse that has in it speed,—carry it farther and say that has nothing else in it but speed,—you have raised a horse that is worth thousands of dollars in the market. Take Nelson for illustration. While he is a most splendid exhibition of a horse, the value of that horse is in speed after all. And if we want a horse to put into a carriage or to ride, we are in the same predicament—we want the speed. So as speed is the leading and controlling feature of the horse to-day, it is a practical question whether we should encourage or discourage it.

Professor JORDAN—I am not connected with a county society, but there are certain things which I believe in. I am not ready to accept the annunciation of the principle which the last gentleman but one made in the opening of his remarks, that "Whatever is, is right." I know Pope said that, but I have regarded it as a false statement on his part ever since I first read it. I know the gentleman would not be willing to allow that the houses of prostitution that existed in this country long before he was born are right; that American slavery that existed for a long time was right; that corruption in New York, that existed perhaps as long as the gentleman's experience, was right. Another thing, I believe in principle and not in policy; and I know this Board believes in that as well as the gentleman who spoke. I am not attempting to disqualify the sentiments of any man; but I do not believe this Board should put itself on record along the line of practical politics. I suppose I ought to explain what I mean by practical politics, and I am willing to do so if the gentleman wishes me to. If, in the judgment of this Board, the expenditure of money to so large an extent as we have expended it, for the encouragement of horse trotting, is not right, we should cast aside motives of policy and vote for what we believe is right. I will allow there is a chance for argument as to whether we should encourage horse trots.

I want to call your attention to a few figures. In one society where the total awards were $602.70, $500 of this was paid for trotting purses; another society, total awards, $619, $462 paid for purses; another, total awards, $468.25, $415 paid for purses; another, total awards $476, $440 paid for purses; another, total awards $838, $700 paid for purses; another, total awards $2.191.29, $1,755 paid for purses. I submit, gentlemen, that that is not a wise use of the money appropriated by the State. I do not think the stipend should be so divided that large amounts should be received by societies that are expending almost all of the money which they expend, in the encouragement of horse trotting. I do not say anything against the trotting horse, but I do not agree with the last gentleman who spoke, as to the fact that speed is the chief element of success in the horses of Maine. I go about the State of Maine a great deal and I hear this remark again and again, "The idea of raising a trotting horse has been a curse to hundreds of farmers." They have spent money in trying to get a good trotting horse, while if they had spent the money in trying to get a good working or driving horse they would have "got somewhere." And besides, whose are these trotting horses? Have farmers had anything to do with these horses except to sell the colt when very young? Farmers did not raise these horses which I refer to; they are owned by men who frequent races,—who are in the horse business not as an encouragement to agriculture but for what they can make out of betting and racing. I submit, moreover, gentlemen, that the atmosphere of the race course is not an atmosphere that it is desirable for us to specially encourage. If there is any place in connection with our fairs where the atmosphere is of a kind that we do not want to put our boys into, it is on the race course. I do not know as that has anything to do with this question, but it seems to me that it has. I believe, gentlemen, that a society that spends all but thirty-six dollars, where the total awards are small, or all but one or two hundred dollars where $1,000 is awarded, for trotting purses, should not have a stipend based upon those trotting purses, but that it should be distributed for the encouragement of better exhibition stock, better products in general.

Mr. Moody—I cannot answer Professor Jordan in proper form, but what he has said has not changed my views any, and there are some points that I can answer. So far as my text is concerned, where I quoted Pope, I am sorry that he tackled me on that, but I think I qualified that statement and shall not go back on it. Pope took a broader view than the gentleman did. Professor Jordan quotes the houses of prostitution and other curses, and I will ask him to look at some other things. I submit to the gentleman that the religion that has existed for five thousand years has built up education, has brought woman up to a condition in which she is equal with man and it is what we live by and what we want to die by. There are many other of these broad principles which the gentleman might see if he would get up high enough and then he would not be obliged to tackle that great peot,—or myself.

I did not get up to make a speech in favor of the trotting horse but I am going to do it because I know it is right to do it.

Professor Jordan says if farmers had let the trotting horses go and had raised horses to work, they would have amounted to something. I will tell you what they amount to. Two weeks ago I saw a seven-year-old mare that was brought from the West, that weighed fourteen hundred pounds and was as sound, smooth and perfect as any horse you ever saw, bought for eighty-four dollars. Do you know of any scrub of a horse that can trot in three minutes, that will not bring that? But that great horse weighing fourteen hundred pounds sold for eighty-four dollars; and I hear and read in the papers that horses of that class are sold for fifty dollars,—in fact there has been a car of horses stalled and sold for freight. Does a farmer undertake to compete with that market? I will be fair about it; probably if the horse was raised right here he would have been worth a little more. But I know that Mr. Vinton is right when he says that speed is what you want. Who wants to go out and show a horse that will not go in three minutes? There is value in speed and it is pretty much all there. A man may have a good stature and be as handsome as I am, and if he hasn't any brains he does not amount to anything; but the little fellow, if he is ever so homely, and has brains, will get somewhere. The size of the horse and his capacity to pull puts him in competition with the ox, and he will bring only about so much money. If you want to get the money value in him there has got to be speed. I know it is wrong for this Board to go on record as being unwilling to give anything to encourage the speed of horses in Maine. Reform the method of dividing the stipend if you will, fix it somehow so that it will be fair and equitable, but I do not believe we want to discourage speed in horses. You say that this money paid in the interest of horse trotting is only for the benefit of a few. I want to call your attention to one thing. We have given money, I was going to say without limit, to stock our ponds with fish. We put a close time on them so that our boys can fish only at certain times; and when that close time is off they come from all over God's creation and catch the fish. Who is benefited by it? The same is true of game; we put out a great deal of money, have game wardens, etc., and we do not get a thing out of it. A man up in Kingfield said that a deer ate his beans all up, and he did not dare to catch him as he would have had to pay a fine of $100. But when the close time is off a man comes with his rifle and fancy clothes and shoots your deer, and you pay for it. I do not say but that is right, I only want to see the eternal consistency of things. When you talk about the things that interest the farmer and come down to his door,—there are more things than trotting horses that he does not get a piece of. I think the Board had better be careful that it does not discourage speed in trotting horses in Maine, because I think we should be a laughing stock if we did this.

Prof. JORDAN—The little, short, homely fellow would like to say just a word or two. I have nothing to say against speed in horses but I submit that the money which has been made out of speed in horses has been made by men with capital, who can handle a plant of trotting horses and take fees for service, and has not been made by the rank and file of the farmers of Maine; that in a very large percentage of cases the farmers who are simply farmers who have attempted to make any money out of raising a colt that would be a trotter, have lost in the operation. As a rule after they have paid the service fee they have failed to get a trotter and have failed to make money. Speed and trotting as now managed are a matter quite outside of the ordinary operations of the farm, a department by itself. I also contend, gentlemen, that it is not necessary to encourage races as they are now being encouraged in order to encourage the raising of good driving horses, the one is not at all connected with the other.

Mr. VINTON—Our little man with the brains is not logical. He says he submits that this matter of speed has not been created by farmers; suppose we grant that. If it has not been done in the past it will not be done in the future, and so farmers are not going to produce that element of value. Now somebody is going to do this if the farmers are not, and if we discourage the men who do it, then this element of value is lost. Look at the hundreds and hundreds of thousands of dollars that have been produced in this way,—so much money in the market in Maine. This has been produced by somebody although he says the farmers have not produced it.

Mr. SMITH—It strikes me quite forcibly that the talk which is being made is leading away from the object of the resolution; and I would call upon the Secretary to read from his report which he presented yesterday the information which he received when he consulted the State attorney in this matter.

Mr. MCKEEN—I would say that I consulted the attorney general in relation to the State stipend, and called his attention to the law, which provides that the stipend shall be divided among the legally incorporated agricultural societies of the State not provided for by special enactment, according to the amount of premiums and gratuities awarded by these societies. He informed me, as I made note of in my report, that in his opinion a purse is not a premium according to the intent of this law; but as it has been the custom to class it as such, it might be well to have a bill put in to cover the case.

Mr. WHEELER—I want to say just a word regarding our society in Franklin county. A few years ago some of us who were interested in registered stock asked the Board of Trustees of the society for an advance in the premiums on certain classes of stock. At that time we had a few old sheds and a very small showing of stock. The trustees advanced those premiums somewhat, and the consequence was a larger attendance of the farmers and a larger exhibit of stock; so that new sheds had to be built the next year, and the year following still longer additions were put on; and I can say to-day that we have some nice sheds and one of the best exhibits of stock that can be seen in any county show. It all came about as the result of a few dollars invested,—a little increase in the premiums paid for stock. The same result was accomplished in the case of fruit. The small sum of fifteen cents used to be paid for the first plate of choice apples of each variety. Franklin county, I think, is somewhat noted for its good apples and of course we had a good exhibit; but by the trustees advancing that premium we more than doubled our exhibit. Will not the offering of larger premiums produce the same result in other societies?

I was surprised when the member from Waldo said that only six cows came from offering ten dollars. I said in my mind, was six cows all that Waldo county could bring out? Let us offer ten dollars in Franklin county and you will see many more than that, I will warrant you. I have been connected with the committee when we have had fifteen good cows right in one class. I have seen that number of heifers in one of the Jersey classes, and also in the grade classes of Guernseys, Ayrshires and Short Horns. I believe in this resolution, gentlemen, as we are looking at it, without the speed question.

Mr. Moody—I would like to ask Mr. Wheeler if they do not run a horse trot in connection with their fair?

Mr. Wheeler—We have horse racing; it is one of the necessities of any show. In our annual meeting a year ago the farmers were left out and the horse men carried it by storm. Of course, as they had four or five trustees they said, "We will do something for horse trotting," and they advertised all over the State, and a special train was run on a part of the roads to bring people to our show. And what did it amount to? It was just simply a farce, and the farmers were indignant; and at the annual meeting this year which occurred a few days ago they turned matters over and put in good, square, honest men, interested in cattle and stock of all kinds, and I believe that those men will give the horse interest a due amount of encouragement.

Mr. Moody—Did you not have other races at that time?

Mr. Wheeler—Yes; and let me say that out of a total of $1,456.46 paid out by our society, the trotting purses amounted to $676.00. I do not own a trotting horse and am not interested in any way, but I do believe that it is for the benefit of every society to offer good liberal purses for free horses that it may develop a feeling for the growing and raising of good colts that shall in days to come be of some benefit to the owners thereof; but I do not believe that much of that money will go to farmers, but to such men as some of our noted breeders in the State.

Mr. Moody—What I wanted to bring out was this,—that they had a horse trot and a successful horse trot Sometimes it happens that one particular trot may be a failure, but I presume they had some good races there, and I submit that the money they had to pay these premiums from they took from the races. I know that this is the case wherever I go.

Mr. Wheeler—We do not depend on the June and August horse races to pay our bills.

Mr. Straw—I was Secretary of our organization for three years and I struggled hard to fill the purses, but I must confess that there was never a "free for all" filled in our society. The farmers in our county do not make a specialty of raising trotters; only those who do make a specialty of the business can raise trotters to amount to anything,—the farmers cannot raise them.

The horse that we need in our counties is the combination horse, the horse that has speed to go with his other makeup. The family horse that is called for to-day is the horse of ten or eleven hundred pounds that can take a family and jog them along at a three minute gait. The trotters that come to us come from a distance, and they take our money from us. It does seem to me that it is not for our interest to encourage outsiders.

I believe in the trotting horse,—I am thoroughly in love with a trot if it be a good one; but I believe that the question of this amendment pertains particularly to agricultural interests, and does not pertain to the trotting horse. And I believe if we put more money into this department of agriculture we shall get better stock and better products.

Mr. Mooers—I do not know as I can add to anything that has been said, but I want to say that I am certainly in favor of this resolution, and I also want to endorse what has been said by Professor Jordan. I think he has said very nearly what I would like to say myself. I do not think that speed is all that is called for in a horse, notwithstanding some of the gentlemen present think that it is. I think that the horse that will find the readiest market in our large cities to-day is the horse with good style and color, that stands fifteen or sixteen hands high, and can take two men in a wagon at any time of day or night and road off at twelve miles an hour, without any oiling or bathing to limber his joints. It seems to me that trotting horses do not need any more encouragement than they are already receiving. It has been admitted here to-day, and I think it is correct, that we must have a horse trot at our fairs. It is the attraction of a large majority of the people, and we are obliged to have it, we cannot get along without it and have a successful fair. Therefore cutting off this State stipend from trotting horses is not going to lessen the inducements for trots. We are going to offer just as large purses without the stipend, because we must have the trots. We say also that the owners of these horses pay fifty per cent of the purses themselves; this is another inducement for us to offer the purses. But admitting all that has been said, admitting that speed should be encouraged, are we encouraging the breeding of trotting horses by offering these large purses? I have been secretary of our society for some six years, and have also taken pains to attend the fairs of other societies and to inquire into the management of the trots considerably, and I pretend to say, according to my experience, that not five per cent of the owners of all the trotting horses there are on our county societies' tracks are breeders of horses. They are simply jockeys who travel around from one place to another, and if they can find an old plug of a horse that they can buy cheap, they will put him on to these tracks and get up a fast record, and perhaps sell him for $100.

These horses are bought for what can be made out of the individual horse. Perhaps they are old horses that have once trotted and got a low record, and they are brought to our fairs and in some other classes or under another name get the money which should rightfully belong to our breeders. But these legitimate breeders of horses, who are giving that business a great deal of attention, and perhaps doing a good thing for the State in that direction, do not come to our fairs or get a dollar out of fast horses. There is no trouble in getting horses to come to our fairs, but it is up hill work to get stock, fruit and vegetables there. We have to travel around among the farmers and contrive all kinds of ways to get stock on to the grounds, and I think that this is the side that wants help. If there is to be any help from the State I think it should go where it is needed,—not where it is not needed,—and I claim that it is not needed in the horse department.

Another feature which has been overlooked is this, one-half of the amounts that are returned to the Secretary of this Board by the societies as paid out for purses are paid back to the societies by the owners of the horses. For instance: a society pays out $600 for trotting purses, puts that figure on to its returns and gets a division of the stipend on that basis; but it has been admitted here by gentlemen who are opposed to this resolution that the society really pays out but $300, as the horsemen pay back one-half of that $600. On the other hand very few societies charge an entrance fee on stock, and in many cases money is expended to get the stock there, besides the premiums which are paid.

Mr. Vinton—It is absolutely certain upon examination of the figures which the Secretary has now made up that there are certain societies, and in looking over the list I am sorry to say a great many of them, that must inevitably have been incorporated for the simple purpose of getting a stipend on amounts paid for horse trotting. Now I say cut that off, even if we get upon the other side.

Mr. Moody—I wholly agree with Mr. Vinton in that respect. I do not want to advocate paying out money for horse racing; I do not believe in encouraging a horse race under the cover of an agricultural society.

On motion by Mr. Winslow this question was now put to vote, and the resolution adopted by a nearly unanimous vote.

Professor Jordan now presented the following resolution and moved its passage:

Resolved, That the Maine Board of Agriculture hereby expresses its approval of the proposition that the Congress of the United States shall authorize the publication of the results of the World's Columbian Fair dairy test for general distribution among the farmers of the country.

Resolved, That a copy of this resolution be transmitted to the members of Congress from Maine, and to the Secretary of Agriculture.

Prof. Jordan—The work at the Columbian Fair dairy test cost a great deal of money and some valuable results were obtained. As I understand it the matter is voluminous, and it is proposed to publish two editions, one of which shall be for reference on the part of experiment station men and those who want to study into the figures, and the other shall give a summary of the general facts of practical interest to farmers; the latter edition to be much the larger. And I understand there is no way in which the work can be published except by special arrangement, or special act by Congress, and it is desired that Congress be informed of the wishes of the agriculturists of the country.

This resolution was adopted, and a second resolution presented by Professor Jordan as follows:

Resolved, That the Maine Board of Agriculture approves the recommendation of the Secretary of Agriculture that the present system of the purchase and free distribution of seeds by the United States Department of Agriculture be discontinued as a nearly useless and a wasteful expenditure of public money.

Resolved, That in the opinion of this Board a portion or all of the money thus expended could be wisely used in testing farm and garden seeds for impurities and in testing new varieties of crops and fruits under the direction of the State experiment stations.

Resolved, That a copy of this resolution be transmitted to the members of Congress from Maine and to the Secretary of Agriculture.

Prof. JORDAN—Secretary Morton in his last report calls attention to the fact that the United States Government is paying out $120,000 odd dollars, for the purchase of seeds to be distributed in small packages by members of Congress, chiefly to their constituency. He gives a statement of the kinds and quantities of seeds purchased, and those of you who are familiar with garden seeds (as you all are, of course) will notice that they are very common seeds that every farmer is familiar with,—so many quarts of ruta baga seed, etc., varieties that we have raised for years, and that can be obtained at a country store. He calls attention to the fact that 60,000 of these dollars are expended for the cost of distribution, the original cost of the seed being about $60,000. A large force is maintained for the sake of sending out these packages of seed, each package of which costs between one and two cents; and I hold that it would be just as sensible to send out pens, ink and paper.

Dr. Goodell has suggested to me to mention the proposition of the Secretary that there shall be given to each state, if it is desirable, a certain amount of money, which would in the sum total be very much less than is now expended, to be used in the actual testing of seeds for impurities, and for the testing of new varieties. I will introduce to you Dr. H. H. Goodell, who will say a few words to you on this subject.

Dr. Goodell—Pardon me for coming before you, or suggesting anything of this kind; but I happened to be in Washington at the Convention when Secretary Morton came before the Association of Colleges and Experiment Stations and made this proposition, namely,—that the present law should be done away with, and that $500 should be granted to each experiment station in the country for the sake of testing and distributing seeds, bulbs and rare plants that were suited to its district; the choice of the seeds, plants and bulbs suited to the district to be left with the Secretary of Agriculture; that when a station had experimented with and tested these seeds or bulbs it should then distribute them to certain farmers in the State, and that these farmers should be furnished with certain blanks which they should fill out and return; and these should be filed with the Secretary of Agriculture. As it is now, no tangible results have ever been reached Seeds have been distributed broadcast, and nobody has reported upon them. A bill has been introduced by the Secretary of Agriculture asking that this change may be made, and that it may be made obligatory upon those to whom the seeds are distributed to return reports in regard to them.

Voted, That this resolution, presented by Prof. Jordan, be adopted.

Mr. L. G. Smith—I would like to go home to my people and look them squarely in the face, having put myself on record as believing in things that are fair and just; and I would like to offer this resolution.

Whereas, It is a matter of common knowledge that certain forms of gambling are allowed at the fairs of county societies holding charters from the State.

Resolved, That when a county society allows any form of gambling to be carried on at its annual fair, it should be disqualified from receiving the stipend paid by the State in aid of such society.

Resolved, That it is the sense of this Board that the law relating to county societies (resolves of 1889, chapter 186) should be amended by inserting after the words "said purposes" in the eighth line of section 11, the words "provided also that each of the said societies shall cause the prohibitory liquor law to be enforced on all grounds over which they have control, and not allow gambling in any form or games of chance on said grounds."

Voted, That the above resolution, presented by Mr. Smith, be adopted.

Mr. Light asks to be released from the committee on legislation, as the duties of that committee would conflict with his business interests. This request was granted and the chair appointed Mr. Skolfield in his place.

Mr. C. E. Wheeler—Gentlemen of the Board, the Secretary in his report yesterday, asked for our consideration of a little matter, namely, the resolution offered by the Pomological Society at their meeting at Foxcroft. I am here as one of the officers of that society, and as one interested in pomology, in the growing of good fruit and the extending of our orchards in the State; and I believe that it is due to the industry that a larger premium be given for fruit than many of our societies are giving. I would ask that your co-operation be given to our society in this matter; and would move that the Board endorse the resolution of the State Pomological Society as passed at their meeting at Foxcroft, January 8th and 9th. This motion submitted and carried.

Mr. Wheeler—I do not wish to take up too much time, as I am one of the younger members, and one who has just come upon the Board; but there is another matter in which I am greatly interested for myself and for the interests of agriculture throughout the State; and I know that many in our section are particularly interested in it. And that is, the matter of purchasing cream.

At the present time five different factories send teams into our town for the purpose of purchasing cream. Farmington, East Wilton, East Livermore, Fayette and Turner creameries all have a part of a route in our town. Some of these factories pay more a pound than others and have a lower test; others will read the spaces differently for the purpose of having a higher test and drawing patrons in that way. And I find that there is some feeling growing out of this matter. Is there not some way in which this Board could arrange the matter so that it may be under the control of some individual, and the system of buying and testing cream be made uniform throughout the State?

I would ask that this matter be referred to the executive committee, and that they report at the next annual meeting. They will have time to look this matter up, and if they deem it advisable and expedient to take any action upon it they can do so.

Voted, That the matter of the purchasing and testing of cream be referred to the executive committee, and that they present their report upon this matter at the next annual meeting.

On motion by Mr. Moody adjourned until 2 o'clock.

THURSDAY, P. M.

Meeting called to order by President Smith.

Prof. W. H. JORDAN—I have been very much interested in this discussion because I have watched it with a view to getting ideas that shall apply to experiment station work. I have been looking at it from my point of view and you have been looking at it from your point of view. I do not suppose I speak for any county, I am sort of a congressman at large.

Perhaps just a bit of personal reminiscence will not be out of place; I had the honor to be a member of this Board when it was reorganized under the new law, and had the privilege of doing institute work in connection with the Secretary at that time. The first institutes that were held under the new law were held in 1880; after this I was out of the State for four or five years, coming back in 1885. I have been more or less connected with institute work since and am perhaps able to judge something of the progress that has been made. I have gone to a little schoolhouse in connection with Secretary Gilbert and some other speakers a good many times and found three or four men sitting around the stove; and for the first half day's exercises they constituted the audience, if we had any meeting at all, and they looked askance at us. I sympathize with Brother Moody about these scientific fellows,—I have had a great deal of trouble with them myself. I know what it is to see men take that attitude,—look askance at the fellow they call a scientific fellow, I know exactly how they look at him. But the scientific fellow, whether Professor Sanborn or some other man, who began in those days to say things that the farmers could not understand fully, did exactly the right thing. I do not say this because I come from an experiment station and am sometimes called professor,—I say it because I believe in it.

Just when the Board of Agriculture stops leading in thought and going ahead of the thought that is common thought and the knowledge that is common knowledge, just then the Board of Agriculture will stop being an educational force in the State of Maine. I say this on general principles. My friends, it is not so much the facts that are taught at an institute, as it is the stimulation of thought, that benefits the farmer. Every farmer works out his own salvation; he has a larger class of facts to discover for himself on his own farm than any other man has to discover for him, and the thing to do is to stimulate that man to thinking of things and studying things that he did not care for at any previous time. The work of institutes and of the Board of Agriculture is very much like the work of the preaching of the Gospel,—if you will excuse the reference to things religious. The minister of the Gospel does not go into the pulpit to tell us things we never have heard of, he goes to tell us things we have heard of a great many times; and the successful minister is the man who convinces you that you must remedy the thing you are doing that is wrong and that you know to be wrong, and so stirs you from top to bottom that you do remedy it. And I conceive that a part, at least, of the work of the institutes is to stimulate the farmers of Maine not to do the things which they are doing which are wrong, and stimulate them to do the things which they know are right.

Another thing I wish to mention, and I am speaking from quite an extended experience in institute work. I believe we need to give a good deal of instruction concerning underlying principles in any farm practice. The details of farm management are different on every farm, but on every farm there are certain general underlying principles which have everything to do with a man's success; and I will simply state briefly without further explanation that I believe we need to put a good deal of force on the teaching of underlying principles.

I would also say, and now you will not misunderstand me, I am in the habit of talking frankly, and you talk frankly with and to me,—I believe in speakers with special training for the subjects they are to present. That does not necessarily mean a man from the college, it may mean anybody but a man from the experiment station or the college, but I believe in speakers that are specially fitted to present the special subject that is to be presented, wherever they got that education,—on the farm, in the class-room or wherever it may have been. If it is a question of commercial fertilizers I believe the man who has handled those from the standpoint of the student and the chemist can present the subject better than some other men. If it is a question of small fruits the man who is familiar with small fruits, not only from the commercial standpoint, but who has made a study of small fruits from the fundamental principles up, is the man who should present the subject. A man must have a special training and fitness for his work or he cannot lead, and it must be a question of leading out ahead of what is common practice and common belief.

Another thing; I believe the speaker should be a man who can impress the thought that he wishes to impress; it is not necessary for him to be eloquent but it is necessary for him to be clear headed and direct and to have faith in what he says.

Those are general suggestions, very frankly stated, and they come to me from what I have seen of quite a good deal of institute work. I assure you that so far as the college and station side of it is concerned, the members of the experiment station force most heartily appreciate the cordial relations and good will that exist to-day between the agricultural department of the college and the farmers of Maine. And I assure you that we only wish to work wherever we can do some good; and wherever that may be you are to be the judges.

Mr. Vinton—We have passed by one county, and I want to say a word in regard to it. We have but fifteen counties represented here, and there are sixteen in the State; there is a vacancy in Hancock county. I remember some years ago, before I had any connection with the Board, that Hancock county did have a representative, I remember one man in particular because I knew him well, Mr. Watson, who was a representative from Hancock county. Then of course there was an agricultural society in Hancock county which sent its representative here as a member of the Board. Now if there is no such society in the county and hence no representative here it would necessarily argue that we are going down hill, losing ground.

I think this matter came up here incidentally a year or two ago, and I think the Secretary then said he believed there was some movement made or about to be made that would revise or organize a county society in Hancock county, so that in time to come it might be supposed that we should have all the counties represented. I wish to inquire if there has been anything done in that line. We all know that Hancock county is not an agricultural county, almost all of its interests are in other lines; but still I confess that I feel a degree of pain that a whole county should not be represented at all on this Board.

Mr. McKeen—I will say that Hancock county has two incorporated agricultural societies. One of them paid out last year $1614.32 and the other $794. But so far as I have been informed by any communication from any of the officers of the societies there has been nothing done in regard to their having a member on the Board. I talked with Mr. Hinckley in relation to this matter a year ago last June; I have also talked with Mr. Greeley of Ellsworth; and they expressed a strong desire that the county should be represented on the Board. In June or July of this year I sent to the President and Secretary of each of those societies a note, calling their attention to the fact that they had no representative on the Board, sending them a marked copy of the agricultural laws, and stating in my note that they would ascertain from careful reading of these laws just what steps it would be necessary to take in order to be represented on the Board.

Mr. WHEELER—While discussing this question of institute work I notice that there are other gentlemen present who are interested in the agricultural interests of this state,—Mr. Burleigh, Mr. Pope and others. Cannot we have some word or suggestion from them in regard to our work? These gentlemen offered timely suggestions.

On motion by Mr. Vinton voted, that the thanks of the Board be extended to the Maine Central Railroad for reduced fares, and to the hotels for courtesies received.

Mr. McKEEN—I wish to thank the members of the Board for the very valuable suggestions which they have given to me in their five minutes' talk in relation to the institute work of the future. While they may be impressed with the thought that they have advanced no new ideas the fact still remains that the talking over of the matter by the members will be, I believe, a means of helping along the institute work of our Board in years to come. It certainly has been a great help to me, an encouragement to me to improve the work for the year which is to come, and other years; and I sincerely thank them for the suggestions.

On motion by Mr. Skolfield voted, that the Secretary be instructed to furnish each member of the Board with 100 sheets of letter paper, upon which should be printed, in addition to the regular heading of the paper used by the Board, the names and addresses of all the members.

On motion by Mr. Briggs, voted to adjourn without date.

OFFICERS OF AGRICULTURAL SOCIETIES.

Name of Society.	President.	P. O. Address.	Secretary.	P. O. Address.	Treasurer.	P. O. Address.
Maine State Agricultural Society	S. G. Jerrard	Kenduskeag	G. M. Twitchell	Augusta	E. G. Evelcth	Auburn.
Eastern Maine Fair Association	J. P. Bass	Bangor	E. L. Stearns	Bangor	E. B. Nealey	Bangor.
Maine State Pomological	J. W. True	New Gloucester	D. H. Knowlton	Farmington	C. E. Wheeler	Chesterville.
Androscoggin County	Daniel P. Field	Auburn	James L. Lowell	Auburn	Joseph G. Ham	Livermore Falls.
Aroostoook County	S. W. Porter	Houlton	A. O. Jones	Houlton	G. H. Gilman	Houlton.
Aroostook, North	Cyrus Chase	Westfield	R. J. Smith	Presque Isle	S. W. Duff	Presque Isle.
Cumberland County	Warren H. Vinton	Gray	Benj. F. Whitney	Gorham	Fred D. Scammon	Gorham.
Cumberland, North	Richard Cook	Edes Falls	R. W. Fogg	Edes Falls	James Thomes	Harrison.
Cumberland Farmers' Club	Chas. A. Merrill	Cumberland C't'r	M. W. Pearson	Cumberland C't'r	N. M. Shaw	W. Cumberland.
Cumberland, Gray Park Association	O. S. Higgins	Gray	J. W. Stevens	Gray	J. W. Stevens	Gray.
Cumberland, Bridgton Farmers' and Mechanics'	Samuel S. Fuller	Bridgton	Isaiah S. Webb	Bridgton	Isaiah S. Webb	Bridgton.
Cumberland, Lake View Park	Arthur Dyer	Sebago	John P. Fitch	East Sebago	John P. Fitch	East Sebago.
Franklin County	Russell S. Currier	East Wilton	Reuben Hatch	Farmington	C. F. Smith	Farmington.
Franklin, North	T. B. Hunter	Strong	J. W. Butterfield	Phillips	E. A. Peary	Phillips.
Hancock County	Frank P. Merrill	Blue Hill	Nahum Hinckley	Blue Hill	M. P. Hinckley	Blue Hill.
Hancock County Fair Association	A. W. Ellis	Ellsworth	H. F. Whitcomb	Ellsworth	H. J. Joy	Ellsworth.
Kennebec County	R. H. Jacobs	Mt. Vernon	Geo. E. Coleman	Readfield	Wm. A. Lord	Readfield.
Kennebec, South	David Given	South Windsor	F. H. Mooers	Pittston	Jasper S. Gray	South Windsor.
Kennebec, Pittston Agricultural and Trotting Park Association	C. C. Libby	East Pittston	G. R. Mansir	East Pittston	H. A. Clark	East Pittston.
Knox, North	E. H. Mero	Union	F. E. Burkett	Union	B. Burton	Union.
Lincoln County	John M. Glidden	Newcastle	E. E. Dunbar	Damariscotta	F. L. Carney	Sheepscot.
Oxford County	John A. Roberts	Norway	A. C. T. King	South Paris	A. C. T. King	South Paris.
Oxford, Riverside Park Association	C. M. Wormell	Bethel	E. M. Walker	Bethel	E. M. Walker	Bethel.
Oxford, West	M. M. Smart	Fryeburg Center	T. L. Eastman	Fryeburg	W. R. Tarbox	Fryeburg.
Oxford, Androscoggin Valley	T. B. W. Stetson	Canton	H. T. Tirrell	Canton	D. W. Goding	East Peru.
Oxford, North	George O. Huse	Andover	John F. Talbot	Andover	John F. Talbot	Andover.
Penobscot County	J. N. Staples	East Bangor	Geo. N. Holland	Hampden	Geo. N. Holland	Hampden.
Penobscot, West	John Rogers	Stetson	T. P. Batchelder	Kenduskeag	T. P. Batchelder	Kenduskeag.
Penobscot, North	Edwin A. Reed	North Lee	L. W. Trask	Springfield	Alvin H. Lindsay	Carroll.

Penobscot and Aroostook...........	John Burnham...	Sherman Mills...	Luther B. Rogers	Patten...........	R. D. Gardner....	Patten.
Piscataquis, East.	B. W. Doble, Jr..	Milo.............	W. H. Snow......	Milo	W. H. Snow	Milo.
Piscataquis, Central..................	S. C. Greeley	Foxcroft.........	F. W. Leland.....	East Sangerville.	F. W. Leland.....	East Sangerville.
Piscataquis, West....................	Wm. F. Towne...	Monson..........	E. R. Haynes.....	Monson...........	E. R. Haynes.....	Monson.
Sagadahoc County....................	Edwin Totman...	Richmond	W. S. Rogers	Topsham	L. E. Smith	Brunswick.
Somerset, East.........................	P. W. Thompson.	Hartland	S. H. Goodwin....	St. Albans........	S. L. Mayo........	Hartland.
Somerset, Central.....	R. B. Shepherd...	Skowhegan.......	S. W. Gould.......	Skowhegan.......	A. R. Bixby	Skowhegan.
Waldo County	Joseph Ellis......	South Brooks ..	G. G. Abbott	Belfast...........	A. S. Redman	Belfast.
Waldo and Penobscot.................	M. C. Chapman ..	Newburgh Vil....	E. H. Nealley. ...	Monroe	F. L. Palmer.....	Monroe.
Waldo, North...........................	Edwin Rand......	Unity	F. A. Bartlett	Unity	James H. Cook...	Unity.
Waldo, West	L. C. Morse.......	Liberty..........	Wm. H. Moody...	Liberty....... ...	S. T. Young.......	Liberty.
Washington County...........	A. S. Fansworth..	West Pembroke..	H. F. Porter......	Pembroke........	N. S. Allan........	Dennysville.
Washington, West.....................	Jas. L. Bucknam.	Columbia Falls ..	E. F. Allen......	Columbia Falls ..	F. L. Allen.......	Columbia Falls.
Washington, Central.........	John K. Ames...	Machias	W. H. Phinney...	Machias	M. Gardner......	Machias.
Washington, North..................	Oscar Pike	Princeton	Willis R. Dresser	Princeton	S. G. Spooner.....	Princeton.
York County...........	E. N. Staples	Biddeford	S. S. Andrews....	Biddeford	Geo. H. Boothby.	Saco.
York, Buxton and Hollis..	Rufus A. Smart..	Hollis............	J. B. Elden.......	Bar Mills	E. A. Hobson.....	West Buxton.
York, Ossipee Valley.................	Howard Brackett	Cornish..........	Jas. C. Ayer......	Cornish	W. P. Perkins....	Cornish.
York, Ramshackle Park...	C. A. Goodwin ...	Woodmans, N. H.	Albert H. Davis.	West Newfield...	Chas. E. Pinkham	North Newfield.
York, Shapleigh and Acton..........	H. J. Crediford...	Shapleigh	Horace Bodwell .	Acton.......	H. A. Stanley.....	Shapleigh.
York, Sanford A. and M. Association	J. H. Makin... ..	Springvale	A. W. Low........	Springvale.	I. A. Butler.......	Springvale.
York, Sanford F. and T. Association	J. P. Moulton	Springvale	M. H. Libby, Jr..	Sanford...........	O. V. Libby.......	Sanford.
York, North Berwick Ag'l Ass'n. ..	Nathaniel Hobbs.	North Berwick ..	Geo. W. Perkins .	North Berwick...	John B. Russell..	North Berwick.

ANALYSIS OF EXHIBITION.

Name of Society.	Number of horses and colts.	Number of thoroughbred bulls and bull calves.	Number of thoroughbred cows, heifers and heifer calves.	Number of grade bulls and bull calves.	Number of grade cows, heifers and heifer calves.	Number of oxen and steers.	Number of animals for beef.	Number of cattle shown in herds.	Number of sheep.	Total number of neat stock.	Number of swine.	Number of poultry coops.
Androscoggin County	160	12	45	10	38	96	17	48	43	266	18	64
Aroostook County	36	9	15	8	16	0	-	4	25	113	8	42
Aroostook, North	63	2	1	-	12	2	-	-	16	96	6	12
Cumberland County	137	22	68	-	3	106	8	45	60	342	31	68
Cumberland, North	41	4	-	3	-	100	4	-	28	180	12	8
Cumberland Farmers' Club	59	-	1	-	18	50	4	10	-	83	4	3
Cumberland, Gray Park Association	61	1	17	2	29	102	2	-	10	163	60	34
Cumberland, Bridgton Farmers' and Mechanics'	31	1	-	-	37	16	4	10	-	99	2	4
Cumberland, Lake View Park	12	2	-	-	14	56	4	-	6	94	1	2
Franklin County	78	26	45	10	53	136	10	60	300	718	-	49
Franklin, North	50	8	19	8	11	120	13	24	156	216	32	11
Hancock County	31	-	-	3	22	22	2	-	34	114	-	3
Hancock County Fair Association	45	1	10	9	12	24	-	-	49	105	4	20
Kennebec County	89	11	40	-	74	130	14	60	108	526	77	15
Kennebec, South	55	4	5	4	16	110	8	12	23	159	14	5
Kennebec, Pittston Ag'l and Trot'g Park Ass'n	14	3	9	1	9	74	5	14	6	125	13	25
Knox, North	62	8	29	9	21	48	8	28	20	234	21	15
Lincoln County	35	4	2	2	24	83	24	11	42	155	32	23
Oxford County	42	39	28	-	73	42	18	36	75	236	25	82
Oxford, Riverside Park Association	52	5	14	7	23	60	-	15	20	144	20	8
Oxford, West	42	7	5	2	5	98	4	-	15	136	21	23
Oxford, Androscoggin Valley	45	16	65	5	38	74	6	26	38	313	17	17
Oxford, North	20	4	33	4	-	43	10	12	49	83	15	13
Penobscot County	33	1	15	3	15	-	-	-	12	79	10	4
Penobscot, West	143	16	32	3	29	62	4	30	127	299	21	41
Penobscot, North	60	5	16	2	15	32	-	-	22	70	-	3
Penobscot and Aroostook	22	1	-	4	33	2	-	2	50	112	2	12
Piscataquis, East	33	-	-	2	18	-	-	-	14	67	2	5
Piscataquis, Central	30	6	10	7	68	8	-	35	26	190	4	30

Piscataquis, West	26	-	-	1	9	4	-	9	13	36	1	2
Sagadahoc County	40	25	84	-	92	98	2	96	27	326	14	158
Somerset, East	33	4	12	3	16	14	3	-	66	151	4	-
Somerset, Central	41	6	10	-	33	52	12	-	89	243	15	20
Waldo County	25	7	24	-	10	36	4	11	40	123	12	8
Waldo and Penobscot	68	10	18	7	15	85	7	30	60	300	11	40
Waldo, North	12	5	14	-	-	10	1	-	30	30	-	5
Waldo, West	15	-	-	2	2	10	-	-	12	29	-	-
Washington County	39	8	30	-	31	12	5	30	25	141	45	30
Washington, West	84	11	18	-	25	26	-	-	12	92	15	57
Washington, Central	36	7	13	-	8	-	12	-	22	62	15	16
Washington, North	48	2	4	4	21	12	-	22	31	102	20	59
York County	32	4	3	-	18	30	4	22	2	125	8	44
York, Buxton and Hollis	14	20	19	12	17	14	6	23	12	137	3	19
York, Ossipee Valley	11	8	24	2	15	141	6	12	7	226	7	6
York, Ramshackle Park	180	9	10	11	39	175	25	22	-	220	-	-
York, Shapleigh and Acton	31	-	-	5	34	176	6	-	10	262	15	23
York, Sanford Agri'ltur'l and Mechanical Ass'n	20	8	22	-	8	150	8	-	25	241	8	21
York, Sanford Fair and Trotting Association	24	-	-	2	10	76	6	4	10	98	-	42
York, North Berwick Agricultural Association	54	2	4	3	4	89	-	8	14	169	15	12

ANALYSIS OF AWARDS.

Name of Society.	Amount awarded trotting bred stallions.	Amount awarded trotting bred brood mares.	Amount awarded draft stock stallions.	Amount awarded draft stock brood mares.	Amount awarded family horses.	Amount awarded gentlemen's drivers.	Amount awarded matched carriage horses.	Amount awarded colts.	Amount awarded horses for draft.	Amount awarded in trotting purses during the fair.	Total awards to horses including purses.
Androscoggin County	$26 00	$9 00	$8 00	$6 00	$9 00	$10 00	$12 00	$24 00	$20 00	$715 00	$839 00
Aroostook County	159 00	3 50	9 00	4 50	4 50	3 50	5 00	17 75	28 75	450 00	685 50
Aroostook, North	9 00	8 00	6 00	6 00	3 50	2 00	–	33 00	6 00	970 00	1,043 50
Cumberland County	47 00	29 00	–	–	10 00	–	20 00	36 00	30 00	2,320 00	2,492 00
Cumberland, North	–	–	–	–	2 50	–	1 00	–	42 00	380 00	425 50
Cumberland Farmers' Club	8 00	3 00	–	–	–	10 00	15 00	7 00	–	525 00	568 00
Cumberland, Gray Park Association	15 00	5 00	–	–	5 00	15 00	8 00	12 00	–	800 00	860 00
Cumberland, Bridgton Farmers' and Mech	–	–	–	3 00	3 00	5 00	3 00	6 00	24 00	–	44 00
Cumberland, Lake View Park	7 00	–	–	–	–	6 00	–	14 00	12 00	500 00	5 39
Franklin County	18 50	11 00	3 00	9 00	–	6 00	4 50	24 00	6 00	676 00	758 00
Franklin, North	–	–	7 00	5 50	–	3 50	3 00	–	–	375 00	494 00
Hancock County	8 00	6 00	–	–	–	6 00	–	23 00	5 00	555 00	603 00
Hancock County Fair Association	40 50	7 00	–	9 00	–	5 00	10 00	30 00	10 00	900 00	1,011 50
Kennebec County	21 00	10 00	8 00	–	10 00	10 00	6 00	26 50	12 00	685 00	788 50
Kennebec, South	7 50	4 40	–	–	1 50	2 65	–	12 95	5 25	350 50	384 75
Kennebec, Pittston Agr'l and T. P. Ass'n.	3 00	–	–	–	4 00	2 00	–	11 50	–	462 00	482 50
Knox, North	5 00	8 00	–	7 50	6 00	6 00	2 50	47 50	11 50	340 00	434 00
Lincoln County	12 00	5 00	8 00	–	20 00	6 00	–	9 25	–	400 00	460 25
Oxford County	45 00	27 00	–	–	–	35 00	–	50 00	73 00	1,433 50	1,663 50
Oxford, Riverside Park Association	5 00	3 50	–	–	–	25 00	–	3 15	38 00	525 00	595 65
Oxford, West	9 00	5 00	–	–	3 00	–	7 00	21 00	21 00	528 00	594 00
Oxford, Androscoggin Valley	24 00	17 00	–	–	–	10 00	5 00	33 00	22 00	382 00	493 00
Oxford, North	3 00	3 50	2 00	–	–	–	1 50	–	31 00	395 00	436 00
Penobscot County	16 00	10 00	8 00	11 00	–	10 00	–	11 50	5 00	300 00	371 50
Penobscot, West	19 00	–	11 00	5 00	–	10 00	5 00	49 00	8 00	860 00	967 00
Penobscot, North	–	–	3 50	3 50	3 50	5 50	–	24 50	4 50	960 00	1,005 00
Penobscot and Aroostook	3 00	6 00	3 00	–	–	3 00	–	14 75	–	270 00	299 75
Piscataquis, East	3 00	3 00	3 00	3 00	3 50	3 50	–	4 50	15 00	415 00	453 50
Piscataquis, Central	15 00	6 00	9 00	6 00	3 00	3 00	3 00	22 00	5 00	359 00	431 00

Piscataquis, West	-	-	2 00	2 00	-	-	1 50	3 25	37 00	8 00	53 75
Sagadahoc County	15 00	8 00	-	-	-	15 00	15 00	35 00	4 00	1,313 75	1,405 75
Somerset, East	1 50	5 50	1 50	-	5 00	3 75	3 75	6 00	7 50	400 00	434 50
Somerset, Central	27 00	11 00	-	14 00	-	7 00	9 00	26 00	-	595 00	804 87
Waldo County	3 00	-	-	4 50	-	3 00	-	12 00	5 00	475 00	502 50
Waldo and Penobscot	14 00	8 00	22 00	6 00	10 00	10 00	10 00	24 00	35 00	995 00	1,134 00
Waldo, North	-	-	-	5 00	-	-	-	10 50	5 00	420 00	440 50
Waldo, West	-	5 00	-	-	-	-	-	13 00	-	440 00	458 00
Washington County	11 00	12 00	7 00	12 00	-	-	-	42 00	-	380 00	464 00
Washington, West	54 00	12 00	25 00	9 00	-	-	2 00	88 00	28 00	675 00	893 00
Washington, Central	10 00	6 00	10 00	6 00	-	2 00	2 00	17 00	25 00	707 00	785 00
Washington, North	8 00	6 00	10 00	6 00	-	-	5 00	25 00	20 00	650 00	730 00
York County	9 00	14 00	-	-	-	-	8 00	14 00	21 00	1,351 25	1,717 25
York, Buxton and Hollis	8 00	5 00	-	-	-	-	3 00	9 00	16 00	700 00	741 00
York, Ossipee Valley	24 00	-	-	-	-	2 00	3 00	14 00	-	1,755 00	1,798 00
York, Ramshackle Park	16 00	6 00	-	-	6 00	10 00	6 00	27 00	6 00	655 00	732 00
York, Shapleigh and Acton	-	-	-	3 50	3 50	-	-	11 00	-	550 00	568 00
York, Sanford Agr'l and Mechanical Ass'n	-	5 00	-	-	3 00	-	7 00	16 00	-	572 50	603 50
York, Sanford Fair and Trotting Ass'n	7 00	9 00	-	-	3 00	7 00	-	20 50	-	1,250 00	1,296 50
York, North Berwick Agricultural Ass'n	-	6 00	-	-	-	4 50	-	12 00	3 00	838 00	863 50

ANALYSIS OF AWARDS—Continued.

Name of Society.	Amount awarded thorough bred bulls and bull calves.	Amount awarded thorough bred cows, heifers and heifer calves.	Amount awarded grade bulls and bull calves.	Amount awarded grade cows, heifers and heifer calves.	Amount awarded herds.	Amount awarded working oxen and steers.	Amount awarded matched oxen and steers.	Amount awarded trained steers.	Amount awarded for beef cattle.	Amount awarded town teams.	Amount awarded oxen and steers for draft.	Amount awarded sheep.
Androscoggin County	$24 00	$61 00	$12 00	$56 00	$18 00	$24 00	$30 00	-	$18 00	$60 00	$70 00	$36 00
Aroostook County	13 00	20 00	10 50	22 00	4 00	-	-	-	-	-	-	29 75
Aroostook, North	8 00	3 00	-	17 50	-	2 00	-	-	-	-	-	10 50
Cumberland County	49 00	71 00	-	33 00	25 00	53 00	31 00	-	12 00	26 00	153 00	43 00
Cumberland, North	15 00	-	5 00	-	-	12 00	15 00	$10 00	6 00	25 00	48 00	9 00
Cumberland Farmers' Club	-	1 00	-	10 00	9 00	23 00	7 00	-	6 00	28 00	22 00	
Cumberland, Gray Park Association	4 00	20 50	4 00	30 00	13 00	7 00	4 00	2 00	4 00	55 00	66 00	8 00
Cumberland, Bridgton Farmers' and Mech	3 00	6 00	-	17 50	-	7 00	5 00	-	5 00	-	35 50	
Cumberland, Lake View Park	4 00	-	-	7 00	-	-	3 00	-	3 00	7 00	13 00	3 50
Franklin County	42 00	51 50	10 00	27 50	35 00	8 00	53 50	-	8 50	47 00	11 50	98 75
Franklin, North	10 25	10 05	5 50	4 60	5 00	7 00	8 00	-	7 25	32 96	3 50	19 50
Hancock County	-	-	8 00	40 00	-	26 00	-	-	2 00	-	7 50	12 50
Hancock County Fair Association	4 00	24 00	13 20	26 00	-	34 75	-	-	-	-	34 00	41 00
Kennebec County	9 50	43 00	-	28 50	23 00	26 50	17 00	12 00	7 50	41 00	-	32 00
Kennebec, South	4 25	6 75	3 40	14 50	8 00	12 25	16 75	-	6 50	40 00	25 00	4 75
Kennebec, Pittston Agr'l and T. P. Ass'n.	4 00	4 00	1 50	5 00	3 00	9 25	7 25	-	7 00	19 00	30 00	3 00
Knox, North	35 00	28 50	15 00	20 25	15 00	2 50	7 50	5 00	6 50	12 00	14 00	9 50
Lincoln County	11 00	2 50	3 50	13 00	4 00	16 00	15 00	5 50	6 50	18 00	28 00	17 00
Oxford County	123 00	112 00	-	104 00	36 00	95 00	41 00	-	12 00	55 00	55 00	48 00
Oxford, Riverside Park Association	18 25	12 75	8 25	10 70	8 00	10 75	9 37	3 00	-	16 00	34 00	10 00
Oxford, West	12 00	11 00	-	19 00	-	18 00	27 00	7 00	7 00	60 00	48 00	4 00
Oxford, Androscoggin Valley	36 00	52 00	9 00	22 50	25 00	27 00	32 00	6 00	9 00	24 00	37 00	19 50
Oxford, North	6 00	7 40	3 50	-	11 00	-	7 75	2 00	5 25	-	16 00	15 25
Penobscot County	4 00	-	4 00	14 00	-	-	-	-	-	-	-	8 00
Penobscot, West	39 50	54 75	3 50	23 25	24 00	28 00	-	-	5 00	-	22 00	20 00
Penobscot, North	7 50	10 50	-	16 25	-	8 00	-	-	-	4 00	5 00	4 75
Penobscot and Aroostook	3 00	-	4 00	16 00	-	2 00	-	-	-	-	-	11 50
Piscataquis, East	-	-	1 75	3 50	-	-	-	-	-	-	-	3 00
Piscataquis, Central	11 50	7 00	-	28 00	18 00	-	6 00	-	-	-	-	12 50

Piscataquis, West	-	-	75	4 00	1 50	-	1 75	-	-	-	2 00	1 75
Sagadahoc County	67 50	145 75	-	109 00	66 00	58 00	29 00	-	5 00	58 00	80 00	29 00
Somerset, East	11 00	10 50	3 25	11 50	-	-	11 95	1 50	4 50	-	-	19 50
Somerset, Central	7 00	20 00	-	37 25	-	12 00	16 00	-	13 00	19 00	30 00	76 00
Waldo County	5 00	5 00	-	12 00	3 00	28 00	5 00	-	7 00	13 00	-	15 00
Waldo and Penobscot	24 00	40 00	6 00	18 00	22 00	14 00	14 00	-	14 00	12 00	34 00	26 50
Waldo, North	16 50	24 50	-	-	-	16 50	-	-	2 00	-	7 00	11 75
Waldo, West	-	-	2 00	2 00	-	8 00	-	-	-	-	-	6 00
Washington County	17 00	25 00	-	23 50	32 00	16 00	-	-	9 00	-	-	18 50
Washington, West	35 00	45 00	-	61 00	-	35 00	-	-	-	-	42 00	17 00
Washington, Central	15 00	16 00	-	14 00	-	14 00	-	-	-	-	17 00	15 00
Washington, North	4 00	10 00	5 00	26 00	-	23 00	-	-	-	-	10 00	15 00
York County	8 00	12 00	-	25 00	11 00	15 00	11 00	-	6 00	65 00	60 00	
York, Buxton and Hollis	5 00	9 00	6 00	13 00	8 00	17 00	-	-	-	-	25 00	9 40
York, Ossipee Valley	34 00	57 00	6 00	21 00	15 00	38 00	35 00	3 00	10 00	64 00	32 00	3 00
York, Ramshackle Park	6 50	8 25	6 50	24 00	6 00	13 00	8 25	40 00	6 00	18 00	19 50	
York, Shapleigh and Acton	-	-	7 00	21 00	-	46 50	25 50	-	6 00	55 00	15 00	3 50
York, Sanford A. and M. Association	24 00	36 00	-	14 00	-	50 00	5 00	3 00	5 00	54 00	19 00	15 00
York, Sanford F. and T. Association	-	-	5 00	17 00	6 00	-	20 00	-	7 00	40 00	22 00	5 00
York, North Berwick Ag'l Ass'n	-	-	5 50	18 00	6 00	21 00	4 50	-	-	15 00	6 00	7 50

ANALYSIS OF AWARDS—Concluded.

Name of Society.	Amount awarded swine.	Amount awarded poultry.	Total awards on live stock.	Amount awarded grain and root crops.	Amount awarded fruit and flowers.	Amount awarded bread and dairy products.	Amount awarded honey, sugar and syrups.	Amount awarded agricultural implements.	Amount awarded household manufactures and needle work.	Amount awarded all objects not named above.	Total of premiums, purses and gratuities awarded.	Per cent of discount in payment of same.
Maine Pomological Society					$789 45							
Androscoggin County	$12 00	$45 00	$5 90	$84 00	46 00	$37 00	$12 00	$5 00	$93 75	$187 00	$1,769 75	
Aroostook County	13 00	24 00	381 75	22 00	15 75	8 75	-	-	14 00	6 50	888 75	
Aroostook, North	3 00	14 75	132 25	73 95	71 25	23 50	8 75	-	39 25	41 00	1,359 95	
Cumberland County	12 00	88 50	768 50	54 00	33 75	28 75	4 00	-	54 00	217 25	3,384 00	
Cumberland, North	3 00	6 00	199 50	13 25	20 50	4 75	-	-	12 00	41 00	671 00	
Cumberland Farmers' Club	-	1 00	150 00	19 00	18 75	1 75	-	-	18 00	3 00	735 50	
Cumberland, Gray Park Association	8 00	17 75	303 25	14 00	15 00	7 65	3 00	-	20 40	36 00	1,199 30	
Cumberland, Bridgton Farmers' and Mech	2 00	4 00	129 00	8 00	9 75	-	-	-	15 25	76 35	238 85	
Cumberland, Lake View Park	1 00	75	81 25	6 50	4 50	3 00	45	-	5 50	1 50	602 70	
Franklin County	-	24 50	501 75	12 30	42 15	10 80	5 80	33 00	37 75	138 91	1,456 46	
Franklin, North	4 75	4 90	142 26	3 00	23 35	5 15	-	-	27 15	36 28	612 19	
Hancock County	-	2 00	146 00	19 75	13 75	11 00	75	-	43 35	4 40	794 00	
Hancock County Fair Association	3 25	10 50	301 70	115 90	66 90	35 75	5 50	-	116 05	72 02	1,614 32	
Kennebec County	17 00	5 00	375 50	55 00	63 00	44 00	7 50	5 00	90 00	47 00	1,362 00	
Kennebec, South	4 25	2 90	183 55	18 40	16 25	6 50	50	-	45 55	6 50	627 75	
Kennebec, Pittston Agr'l and T. P. Asso'n	2 50	2 25	118 25	11 50	12 65	75	-	-	11 25	2 60	619 00	
Knox, North	4 00	11 75	235 00	18 25	42 50	10 75	9 00	1 00	52 50	38 25	792 75	
Lincoln County	4 50	13 00	217 75	35 25	30 50	24 50	4 75	1 00	55 00	-	768 75	
Oxford County	24 00	30 75	965 75	33 50	49 00	25 50	14 75	11 00	32 25	91 85	2,657 10	
Oxford, Riverside Park Association	11 50	4 50	230 72	6 25	9 55	9 15	-	-	13 90	9 75	805 32	
Oxford, West	13 00	3 00	823 00	43 00	14 00	27 85	3 00	5 00	62 60	26 50	1,004 95	
Oxford, Androscoggin Valley	8 00	16 00	434 00	14 95	34 90	13 50	5 95	3 00	15 40	46 65	950 35	
Oxford, North	7 00	8 00	130 15	15 50	11 25	9 50	5 00	6 50	25 00	9 85	607 75	
Penobscot County	5 00	1 75	108 25	40 00	20 75	3 00	-	-	46 25	-	518 25	.10
Penobscot, West	12 00	25 40	364 40	29 40	28 60	24 75	8 80	8 00	120 45	21 00	1,465 40	
Penobscot, North	-	1 50	102 50	6 25	13 50	9 00	3 00	5 00	27 95	4 25	1,131 45	
Penobscot and Aroostook	6 00	5 75	78 00	14 50	13 75	7 75	-	-	18 65	10 25	412 90	
Piscataquis, East	2 00	1 25	50 00	-	-	1 50	-	-	-	1 75	468 25	

Piscataquis, Central	5 00	11 00	171 00	4 00	16 00	13 00	3 50	-	4 30	6 50	577 30	.100
Piscataquis, West	75	75	59 00	3 10	2 40	2 00	50	75	80	6 85	83 40	
Sagadahoc County	23 00	111 75	874 00	134 25	97 50	37 25	10 00	37 00	63 25	94 10	2,808 22	
Somerset, East	8 00	-	116 00	6 00	1 85	8 25	2 80	-	18 75	39 65	593 30	
Somerset, Central	5 50	19 00	254 75	-	-	96 00	-	-	175 00	-	1,330 62	
Waldo County	5 00	8 00	133 50	42 00	18 00	-	-	-	49 00	6 00	721 00	
Waldo and Penobscot	2 00	18 00	383 50	34 25	24 00	9 50	5 50	-	146 65	-	1,623 35	
Waldo, North	-	3 50	102 25	27 75	6 25	6 55	2 25	-	33 75	-	598 80	
Waldo, West	-	-	36 00	-	-	-	-	-	-	-	476 00	
Washington County	16 00	18 75	259 75	11 00	19 50	12 75	6 80	-	58 59	44 06	822 45	
Washington, West	13 00	48 50	514 50	112 85	105 25	27 25	3 90	-	92 90	375 25	1,921 90	
Washington, Central	8 00	12 00	189 00	48 25	16 00	9 40	-	-	61 05	244 75	1,275 45	
Washington, North	17 00	67 00	257 00	47 50	19 25	8 50	-	-	60 00	45 00	1,264 25	.02
York County	2 00	58 00	389 00	14 00	15 00	-	-	-	-	-	1,769 25	
York, Buxton and Hollis	5 00	-	138 40	-	-	-	-	-	-	-	838 40	
York, Ossipee Valley	6 00	3 00	370 00	12 00	13 00	3 10	1 70	-	23 49	13 00	2,191 29	
York, Ramshackle Park	-	-	233 00	7 50	8 75	6 25	-	5 00	17 25	33 25	967 00	
York, Shapleigh and Acton	7 00	12 00	216 50	51 50	30 25	9 75	-	-	6 75	68 50	932 75	
York, Sanford A. and M. Association	14 00	25 00	295 00	34 80	10 50	10 75	-	-	25 00	-	948 55	
York, Sanford F. and T. Association	-	29 75	198 25	29 50	33 50	-	2 00	-	55 00	52 50	1,620 75	
York, North Berwick Agricultural Ass'n	9 00	4 50	122 50	24 05	5 00	3 00	2 00	-	17 50	-	1,012 05	

FINANCES.

Name of Society.	Amount received from State.	Receipts for membership.	Receipts from loans.	Receipts from entry fees for trotting purses.	Receipts from all other sources.	Total receipts.	Amount expended in improvements.	General expenses.	Total amount paid out.	Value of property belonging to the society.	Amount of liabilities.
Maine State Pomological Society	$538 64	$79 00	$600 00	-	$ 532 00	$1,749 64	-	$565 19	$1,654 64	$ 200 00	$1,060 27
Androscoggin County	284 73	78 00	-	$322 00	1,497 87	1,897 87	$ 75 00	470 11	1,895 16	1,000 00	700 00
Aroostook County	141 21	13 00	169 41	227 50	698 61	1,249 73	-	219 77	1,249 73	200 00	445 41
Aroostook, North	176 98	52 00	-	434 75	1,240 16	1,903 89	100 00	341 60	1,513 95	-	800 00
Cumberland County	389 78	90 00	-	1,040 00	4,538 38	6,058 16	515 84	1,498 73	6,050 48	6,000 00	800 00
Cumberland, North	116 50	-	-	45 00	645 61	807 11	249 13	735 07	984 20	2,000 00	300 00
Cumberland Farmers' Club	145 59	6 00	-	221 25	863 03	1,235 87	-	1,158 73	1,158 73	3,203 25	325 00
Cumberland, Gray Park Association	195 29	-	-	247 50	1,240 32	1,683 11	305 84	308 73	1,813 37	8,000 00	1,300 00
Cumberland, Bridgton Farmers' and Mech	-	-	-	-	-	444 36	-	92 86	331 71	600 00	
Cumberland, Lake View Park	-	-	-	93 00	428 05	521 05	25 75	518 71	544 46	1,400 00	200 00
Franklin County	202 76	710 00	-	211 50	1,359 85	2,333 25	110 27	404 00	1,731 82	6,000 00	
Franklin, North	89 20	250 00	-	138 00	829 25	1,306 45	-	50 00	1,271 45	3,000 00	1,950 00
Hancock County	133 38	-	-	133 75	840 39	1,107 52	150 00	202 75	1,146 75	4,000 00	1,000 00
Hancock County Fair Association	260 15	-	-	333 25	3,340 42	3,933 82	440 42	1,729 96	3,784 70	11,599 25	
Kennebec County	198 41	5 00	720 00	128 00	1,320 99	2,372 40	504 32	506 08	2,372 40	2,000 00	720 00
Kennebec, South	89 66	-	-	74 50	1,071 88	1,236 04	214 88	405 09	619 97	1,410 88	
Kennebec, Pittston Agr'l and T. P. Asso'n	112 33	-	-	188 50	615 14	905 97	43 50	122 50	884 00	1,500 00	480 00
Knox, North	72 96	314 47	113 45	148 50	343 37	992 75	-	-	1,087 75	-	95 00
Lincoln County	47 43	6 00	72 25	70 00	675 75	871 43	94 99	282 83	1,051 58	2,800 00	850 00
Oxford County	360 32	16 00	-	664 50	3,753 34	4,794 16	-	1,324 71	4,853 19	10,000 00	1,466 85
Oxford, Riverside Park Association	-	-	-	225 00	886 01	1,111 01	60 00	260 00	1,158 94	2,188 62	580 00
Oxford, West	198 18	37 00	-	191 15	1,404 80	1,831 13	150 00	250 00	1,560 00	6,000 00	1,500 00
Oxford Androscoggin Valley	218 31	15 00	-	136 50	1,285 68	1,655 49	150 00	615 49	1,715 49	2,500 00	2,975 00
Oxford, North	96 23	-	5 28	149 50	724 37	975 38	175 00	201 00	983 75	2,000 00	
Penobscot County	-	-	-	-	48 22	521 94	-	266 88	749 13	-	
Penobscot, West	162 46	49 00	-	441 25	1,908 06	3,560 77	441 89	2,575 82	3,014 46	2,500 00	543 06
Penobscot, North	118 13	8 00	90	40 95	74 92	242 90	-	60 12	1,191 57	-	-
Penobscot and Aroostook	100 00	11 00	-	164 50	638 31	913 81	65 26	435 65	913 81	2,000 00	2,000 00
Piscataquis, East	54 25	17 00	-	158 00	325 00	537 25	-	17 50	482 50	-	-

Piscataquis, Central	85 93	-	-	46 75	433 13	665 71	-	140 00	480 00	-	-
Piscataquis, West	11 89	50 00	-	-	38 01	99 90	-	36 97	175 12	-	59 15
Sagadahoc County	391 65	615 00	210 26	698 75	2,705 89	4,621 25	575 00	1,238 23	4,621 55	5,000 00	600 00
Somerset, East	156 92	25 50	-	266 50	696 46	1,145 38	-	138 08	1,013 48	3,100 00	2,136 50
Somerset, Central	-	-	600 00	292 00	780 54	1,672 54	11 57	337 92	1,680 11	2,500 00	600 00
Waldo County	110 12	20 00	-	189 50	395 40	715 02	100 00	80 00	901 00	3,500 00	-
Waldo and Penobscot	250 00	-	71 36	527 00	2,440 00	3,288 36	1,238 22	2,168 84	3,407 06	3,500 00	-
Waldo, North	113 31	35 00	-	179 00	535 75	863 06	-	200 91	881 46	-	105 00
Waldo, West	95 58	-	-	70 00	257 19	432 77	250 00	175 00	901 00	-	-
Washington County	127 17	5 00	12 87	147 00	911 90	1,203 94	-	545 65	1,368 10	1,800 00	-
Washington, West	343 35	7 00	-	220 00	2,299 98	2,870 31	-	945 03	2,866 93	1,616 38	-
Washington, Central	67 10	8 00	-	287 00	1,035 80	1,397 90	-	297 86	1,573 31	-	1,000 00
Washington, North	136 71	-	565 55	332 50	1,004 65	2,039 41	415 06	1,624 35	2,039 41	3,000 00	1,600 00
York County	306 78	-	6,250 00	545 75	2,380 09	9,482 62	6,250 00	3,172 53	9,422 53	7,000 00	6,400 00
York, Buxton and Hollis	138 83	7 00	-	325 00	868 76	1,339 59	125 00	309 00	1,372 84	3,100 00	1,678 00
York, Ossipee Valley	200 00	10 00	1,077 45	825 00	1,739 93	3,842 38	500 00	675 90	3,836 03	6,500 00	2,695 54
York, Ramshackle Park	112 06	-	-	436 00	746 14	1,294 20	-	250 00	1,281 00	4,500 00	-
York, Shapleigh and Acton	196 42	212 00	132 56	245 00	150 00	935 98	-	-	932 75	3,350 00	-
York, Sanford A. and M. Association	170 34	-	-	297 50	761 90	1,229 74	138 30	308 10	1,394 95	5,000 00	451 80
York, Sanford F. and T. Association	-	-	-	798 75	1,970 10	2,768 76	322 52	741 49	3,234 76	7,000 00	4,000 00
York, North Berwick Agricultural Ass'n	-	-	2,000 00	422 85	2,152 76	4,575 61	2,419 96	1,471 05	3,891 01	8,000 00	5,900 00

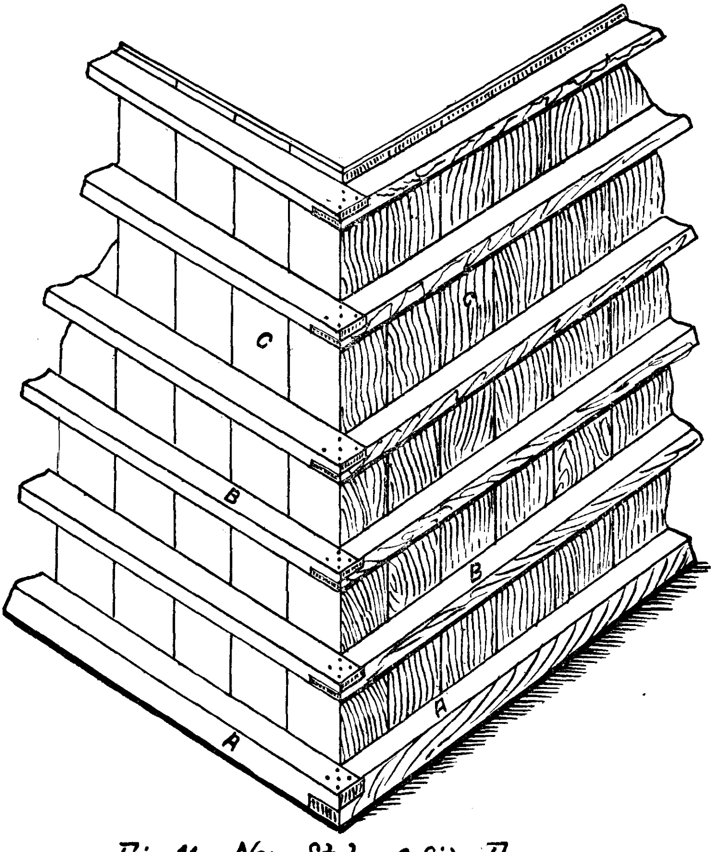


Fig 11. New Style of Silo Frame.

This figure shows a somewhat new style of silo frame, and is a very good one, particularly for outside silos. The frame can be adapted to any space desired, and can be made solid, according to its size, by placing the ribs nearer together or further apart as circumstances may seem to warrant. The sills are usually made of four by six or eight inch lumber, and the ribs of two by six or eight inch, having them of uniform width and while it will be necessary to halve the corners of the sills together the other timbers can be nailed together by placing the two on opposite sides above the others. They are usually placed about eighteen inches apart for the first few sections and further apart nearer the top where the pressure will be less. The door may be made to extend from the bottom to the top by simply cutting out the upright boards for the width desired. There are several of these silos in Maine, and those who have them speak very highly of them.

PAPERS PRESENTED AT INSTITUTES.

STOCK-RAISING, FORAGE PLANTS AND GRASSES.

Stock-raising has been the leading occupation of mankind ever since his creation, and must continue to be so long as the earth is peopled by mankind. The very first business of mankind was tilling the soil, which, it is natural to conclude, could hardly be done without stock.

We know little more than nothing about the methods of agriculture in its earliest days, how the land was tilled, what kinds of implements were used, or how crops were cultivated. The Bible, which gives us the first authentic knowledge of man, is almost silent on agricultural matters. "Adam gave names to all cattle and every beast of the field." His oldest son was a "tiller of the ground," and his youngest son a "keeper of sheep."

Far away back in the ages of antiquity, there must have been cultivated fields, and some of them large. Cattle, as now, subsisted on hay and grass; and cereals, meat and vegetables were raised for the people.

"And I will send grass in thy fields for thy cattle, that thou mayest eat and be full." "The hay appeareth, and the tender grass showeth itself." "The lambs are for thy clothing." "Surely the churning of milk bringeth butter." "Carry these ten cheeses to the captains of their thousands." Numerous little fragments like these are scattered through the Old Testament, and gives us all the knowledge we have of agriculture in its earliest stages.

Job must have been a large farmer, for he had "five hundred yoke of oxen," which we must reckon a thousand animals, which were employed in farm work. Later in life, his farm stock consisted of "fourteen thousand sheep, six thousand camels, a thousand yoke of oxen, and a thousand she asses." The many declarations in the Old Testament, referring to these topics, assure us that stock-raising, in connection with tilling the ground, was the primitive occupation of man.

In the patriarchal ages, stock-raising was followed very much as it is now in some of our western states and territories. But while the herdsmen were moving from place to place over vast districts as best suited their interests, it is more than likely that tilling the ground was not neglected; for we read of plowing, sowing and harvesting, but of their methods of farming, we know but very little.

In the early history of Rome, agriculture was held in high esteem; and it was not till after her boundless conquests had introduced many discordant and demoralizing elements, that farming fell into disrepute and contempt. The Roman, Cato, was a farmer, and delighted more in tilling the soil than anything else. He worked in the field with his workmen, and sat at table with them at meals. On being asked "what was the most assured profit rising out of land," replied, "to feed stock well," and next to which was "to feed with moderation," which is far from being in accordance with the system now practised.

The farm stock in Maine in January, 1893, according to the report of the statistician of agriculture, consisted of 111,051 horses; 174,120 milch cows; 145,031 other cattle; 398,704 sheep; and 76,918 swine. All this stock ought to be supported upon the products of our farms, without going outside the State for a pound of anything. Raising stock in Maine, and going away some two thousand miles, and paying another party for raising material to keep it on, to say nothing of the cost of transportation and commissions, does not seem to be just the right thing for the farmers of Maine to do.

We grow our own hay to be sure, but we sell a large percentage of it, which is replaced, in part, by buying corn, wheat, flour and other concentrated food, which we ought and may produce on our own farms. But, instead, we are selling our farms, by piecemeal, in Boston and other cities in Massachusetts, and console ourselves by assuming a fact, that we are evening up the thing by buying the soil products of far off states. If all the hay produced on Maine farms were consumed thereon, it would be only a short time before our stock would be doubled. This means more manure, more hay, and better crops of every kind. Instead of going to Nebraska for corn, and the western farmer for wheat and flour, we say, look here, this business has gone on long enough, too long, and we now propose to raise our own corn and wheat. We have recently found out that we can raise as good corn and wheat as you, and more of it per acre too, and we are going to do it. We are going to do it by feeding our hay at home, thus enabling us to largely increase our farm stock, by which we can put our fields in condition to grow the cereals, for which we have so long depended upon you.

Grass lies at the foundation of all successful farming. It includes all the cereals, and most of the forage plants used as food for farm animals. We see the hand of a Divine Providence in so diversifying the varieties of grass, and adapting them to every condition of climate, that there is no spot on the surface of the earth, where some kind of grass does not grow for the subsistence of domestic animals. It is found away up to the line of everlasting snow in the cold regions of the north, and down in the tropical regions under the scorching rays of an equatorial sun.

Were it not for these grasses, upon which our domestic animals subsist, mankind would soon disappear from the earth; for by them, our fields are kept fertilized, so that the cereals, which are the "staff of life," are grown in yearly abundance; so that our fields do not cease to yield their annual crops of hay and other food for farm animals, which, in turn, furnish us with meat and clothing. As our bread, meat and clothing come directly and indirectly from stock raising, its importance to the world can hardly be comprehended.

As grass and hay constitute the basis of cattle food, they may well claim the farmer's first attention. The hay crop of Maine runs from about one million tons up to nearly one and a half millions, and will average pretty well up to one and a quarter millions yearly, which at twelve dollars per ton, amounts to $15,000,000, more money than a man can count in a year. If it were represented in a ribbon of one dollar greenbacks, it would extend a distance of more than 1,700 miles. In 1888, the hay crop of this State was worth, according to the statistics published by the government, over ten millions of dollars more than all the cereal and vegetable productions of the entire State put together.

I hardly know how to treat a subject of so great importance to our farmers as the one under consideration to-day. I cannot speak from a scientific stand-point, yet there may be some practical points gathered from personal experience and observation, that may be of some value.

Every product of the farm costs something. Hay costs something, corn costs something, grass costs something; but that which grows without cultivation costs less than cultivated crops by the cost of cultivation. It does not follow that grass costs nothing because it simply "grows." It cannot grow without food, which must be supplied at the expense of the soil, which, in turn, must be supplied, or grass will cease to grow.

Some years ago, I read a paper on the cost of a ton of hay at an institute held in Saco, which was made to be a little over $11.50. This took many by surprise, as I was aware it would. They conceded that my points were well made and sustained, but could hardly believe that a ton of hay cost $11.50 on an average farm in Maine. The discussion that followed fully sustained my figures. A leading farmer from Limington, and by the way, a graduate from our State College, and of course, a scientific farmer, made a ton of hay cost on his farm, between twelve and thirteen dollars, nearer thirteen I think. I make these statements simply to impress upon our farmers the fact that hay is costing more than they are aware of, and when it is sold for less than ten dollars a ton, they are losing money every time. But can we do better? Mr. Ellis, member of the Board of Agriculture from Embden, says we can realize twenty dollars per ton for it, by feeding it on the farm for the production of milk, butter and cheese. He is doing it, and tells us how we can do it.

Growing here and there all over the world, botanists tell us there are about six thousand species of grass; but, aside from the cereals, there are but few generally cultivated in this State.

There are three ways by which farm stock is supplied with grass food: by pasturing, letting cattle consume it on the ground where it grows, which, on the whole, is probably the best method, where it can be done, so far as relates to the food; by the soiling method, and by cutting and drying it for hay. The first two can be followed only a part of the year, while the third, if necessary, can be followed the entire year. All three methods have their advantages, and pasturing in a few instances, is giving way to soiling on some dairy farms.

Our open lands are divided into mowing fields and pastures. Now if you carefully examine the latter, you will find many varieties of grass that do not appear in the mowing field. Some of these grasses came forward early in the season, and as the season advances, other varieties come forward, new and sweet from the earth, thus affording a variety of new, fresh feed all through the summer and autumn. These edible grasses, not only furnish a variety of food, which cattle like as well as human beings, but they make a strong sod, which is important in pastures as well as mowing fields.

A good plan, not generally adopted by our farmers, would be to divide their pastures into several lots so as to avoid continuous grazing over the same ground. By shifting the cattle from lot to lot, alternately, they will have the advantage of continuous fresh feed. By these frequent changes, one lot is resting and growing new, sweet grass, while another is being grazed. By this method, cattle will have a good appetite right along for the tender, succulent grass, and will do better than by continuous grazing over the same ground.

Whether this method is adopted or not, young stock and sheep will cut and consume their own food on the ground where it grows, during a large part of the year, for many years to come. Under the present condition of farming land in our State, pasturing is decidedly cheaper than soiling.

The practice of soiling, so far as I know, is not followed to any great extent; but where it has been tried, it seems to have proved satisfactory, according to the reports. During the time flies are troublesome, there is no doubt that cattle would do better in yards or open tie-ups, and fed upon green, succulent food, than when running in pastures and tormented by these pests.

It is claimed that a given area of ground will produce twice as much eatable food, if it be cut and fed elsewhere, as it will when cattle are constantly feeding over it, tramping upon it and fouling it with their voidings. This is true to some extent, but, I think, not to that claimed for it. It is also urged that cattle eat less, and fatten more rapidly than when roaming over the pasture; and also, that their excrements, solid and liquid, may all be saved, and used to better advantage than could possibly result from pasturing.

In this latitude, green crops can be fed only a part of the year, as a growth sufficiently large enough to cut cannot be attained till summer. Ensilage, of which I shall speak hereafter, is a substitute for green fodder.

Whatever may be said in favor of soiling, and it has some very strong points, pasturing is decidedly to be preferred. It is in the nature of cattle, as in man, to love and enjoy out-of-door life; and when you strike out a law of nature, you disturb its economy, and subvert the purpose for which it was made. All the laws of our being rebel against confinement. It is a source of extreme uneasiness, discontent and debilitation. It cuts off the sources of natural activity, which is indispensable for the development of the body and constitution.

Cattle will live in confinement, and they may be so conditioned that it may be better for them for the time being.

Pasturing involves less labor than any other way of keeping stock. In fact, the labor expense is reduced to almost nothing. Again, cattle do better, and are healthier, when free to move here and there, feed when they will and where they will, drink when they are thirsty, and then lie down in the shade in contentment and breathe the pure air of heaven.

Western and southern corn were formerly grown to help out the autumn pastures when feed got short. It was sown broadcast on ground especially prepared for it, and covered with a harrow. It made enormous growth, and was cut and fed green, morning and evening. It was them considered a good fodder, but in the light of la'er experience, it has been discounted about ninety-nine per cent.

In Massachusetts, rye is grown both for soiling and to be made into hay. It is not raised extensively, as heavier crops of other grasses can be grown on loamy and clayey soils. It may be well to grow it as a catch crop on light, sandy soils.

In England, Italian rye-grass is cultivated to a large extent for soiling purposes, and is very much valued on account of its rapid and heavy growth, and nutritive qualities. Three cuttings are taken from the same piece in one season. It is a native of Italy, and was, I believe, introduced into this country from England. Seeing that this grass possesses such wonderful properties, I wonder it is not more generally cultivated here. I do not read much about it in our agricultural papers, nor do I find it much more than referred to in our State and National reports.

There can hardly be a better green crop than clover, of which there is plenty on many farms. It grows rapidly after the first crop has been removed, and by the time grass is short in the pastures, it has attained a good growth, and will afford the best green food for cows in milk. The objection to clover is that it is short-lived, not much appearing after the second year. But where it can be grown, it makes the cheapest and best autumn soiling crop the farmer can grow.

Sweet corn is another excellent soiling crop, and is extensively used for this purpose, as it can be cheaply produced. Near corn-canning factories, it is grown for the double purpose of selling the matured ears at the factory, and using the fodder and imperfect ears for stock; but remote from factories, it is fed ears and stalks together. On the whole, sweet corn fodder is one of the best and cheapest green foods we can grow. It is greatly relished, succulent and nutritious, fed as above.

Mixed grain makes a good soiling crop. It is now quite common to sow wheat, oats and peas for a soiling crop. On well fertilized ground, these grains make a heavy growth. When the grains are fully formed, say in the full milk stage, it is in the best condition for soiling. It also makes an excellent feed when cut in this condition, cured and fed as hay. Some farmers prefer letting it mature, threshing it, and feed the straw and grain separate.

I do not know as alfalfa will grow in this climate, I don't know that it has ever been tried. It is certainly a very valuable crop where it will grow, both for soiling and for hay. In California, it grows so rapidly that four or five crops can be taken from the same ground in one season. I saw it growing, and when dried for hay, if cut young, the stalks are small and full of fine leaves.

In answer to a question as to its yield, I was informed that an acre would produce ten tons of cured hay in one season; and that it may be taken off year after year without any appreciable diminution in yield. No fertilizer is used, and apparently, there is no depreciation in the crop.

By the way, I may state that in California, hay is made from wheat, barley and oats, cut just before they are ripe. I did not see a stalk of timothy, red-top or clover in the state.

That winter stock food may be preserved in a condition as near to that of summer as possible, green crops are stored in silos. Silos are numerous and increasing all over the State. Ensilage, as a winter food for stock is regarded favorably by those who have used it. As compared with other bulky material, it is claimed to be the cheapest stock food known.

I have never seen an analysis of corn stover, and have no means at hand for figuring out its value as compared with hay. But assuming that three tons are worth as much for feeding purposes as one ton of hay, it will not take much figuring to approximate its comparative value. According to good authority, an acre of land that will produce one ton and a half of hay will produce twenty tons of green corn fodder, equal in value, to six and two-thirds tons of hay. Reversing it, the hay, if weighed green, would make four and a half tons of ensilage, and the corn fodder when dried, would make from five to six tons. If the cost were alike, the difference in feeding value would be that between one and a half tons of hay, and say, five tons of dry corn fodder; or that between the hay, whether dry or green, and twenty tons of ensilage. But the cost is not alike. The plowing, harrowing, seed and subsequent cultivation while the crop is growing, must be charged to the ensilage.

The cost of cutting and curing one and a half tons of hay is three dollars, while that of cutting, and putting into the silo the corn fodder is about six dollars. Another factor which may affect the difference in cost is that in plant nutrients between what a ton and a half of hay removes from the soil, and what is required to produce twenty tons of fodder corn. This can only be determined accurately by chemical analysis.

A gentleman, who has had quite an experience in growing corn for the silo through a number of years, tells me that, so far as he can judge from the manure he applies, and from subsequent crops, twenty tons of corn fodder remove no more fertilizing material from the soil than a ton and a half of hay. Assuming this to be correct, we have six dollars charged for plowing, harrowing and after cultivation, and three dollars cost of harvesting over that of hay, making nine dollars to be charged to the ensilage above the cost of hay. Adding the nine dollars to the hay, makes it equivalent to two and a quarter tons. I do not claim that these figures are correct, for they are drawn mostly frcm estimations; but assume them to be so, the question may be stated as follows: Which has the greater feeding value, two and a quarter tons of hay, or twenty tons of ensilage?

A long experience in feeding ensilage has indisputably demonstrated that it is both nutritious and wholesome for stock. It is succulent and easily digested, and excellent for cows in milk, increasing the flow, and making it richer. It takes the place of roots in winter, when no green food can be had. It affords a most excellent substitute, carrying the green, succulent, summer food into the winter.

All the cereals, common grasses and clover, in fact, any green edible herbage can be made into silage by the same method. At present, fodder corn takes the lead.

I have thus far presented only the favorable side of the question. There is another side, as there is to every question. It is disputed by some scientific men whether ensilage has any feeding value over dry fodder. It is contended that dry fodder retains all its original elements, except water, and therefore, is equal in nutritious value to the green material from which it is made. It is not claimed that anything is added to the nutrients in green fodder by siloing it. On the other hand, it is contended that when fermentation commences, decay also commences, and that no food is so valuable after decay begins, though stock may eat it quite as well. It is also contended that fodder corn, or any other ensilage crop can be preserved and held quite as well by other methods as in silos; and that when fed to milch cows, the flow will be as full and the milk sweeter than that which comes from ensilage food. Still, silos are wonderfully successful, and constantly increasing, which seems to prove that the system is profitable and not injurious to farm animals.

It is thought by some that the use of green, fermented food, together with the high feeding now practised, may be one of the causes of cattle diseases. Who knows? Before the days of silos and high feeding, modern cattle diseases were unknown. Like everything else, the system of feeding stock is changing. What is considered a perfect feed to-day, in a score of years may be abandoned as faulty. How true the saying, that "The wisdom of to-day may be the foolishness of to-morrow." Changes are not always improvements.

We come now to our field grasses, by far the most important of all forage plants, timothy or herds-grass, as it is called, and red-top. There are other cultivated grasses, but these are the all-important ones for hay. Timothy is grown all over New England, in the northern states, and in Canada. It has no superior for farm stock, and is the grass for Maine. Red-top makes an excellent hay for neat cattle. It has a finer stalk than herds-grass, and will grow on most any soil, but does best on moist land. If the soil be rich, it will make a heavy growth. Its roots intermingle and make a strong sod, which is an important matter, not to be overlooked; and the seed is sown with timothy for this purpose, as well as for mixed hay.

Clover, though it does not belong to the grass family, is also with timothy and red-top, largely cultivated for hay. The common red clover and alsike are the varieties most commonly grown. The alsike has a smaller stalk and more branches than the red, and, on land in fair condition, will make a large growth. These, then, are the plants we depend upon mostly for hay. Considering the great importance of the hay crop to Maine farmers, it deserves our first attention, and more especially, as every other farm crop depends largely upon the success of this.

As the success of farming depends upon the hay crop, whatever other crop is neglected, the grass crop must not be. After raising it, make the best use of it by feeding it on the farm. Sell the stock grown on it, but don't sell the hay.

How can we best keep up our hay crop, and increase it, is the question that confronts us to-day.

I am not now, nor have I ever been, an advocate of top-dressing land in grass for the purpose of keeping it in grass; not only because I am opposed to the one crop system, but because I believe it to be a waste of manure to a very large extent. I believe in rotation of crops, and in fertilizing the ground by thoroughly incorporating the manure with it.

By taking the same crop year after year from the same field it will rapidly impair the fertility of that field. This is plain enough, and needs no argument.

It may be claimed (theoretically) that a yearly dressing equal to what the crop has removed, will keep the grass at a permanent, even yield. But from a series of varied experiments carried on through a number of years, I am thoroughly convinced that the crop cannot hold its own, on account of waste which results in some way.

In cultivating a plot of land by the side of a plot in grass, in the same condition, and applying equal amounts of barn-yard manure to each, I found, at the expiration of a number of years, there was an advantage of fully fifty per cent in favor of the cultivated plot, where the manure was worked into, and covered by the soil.

It is claimed that no part of manure which is distributed over the surface of land is, or can be, lost, that nothing but pure water evaporates. Though the benefit may not all appear in the hay crop, it is all in the soil, and will appear in subsequent crops. Though I am not able to explain, I believe science is at fault in this particular.

I am talking before men whose explanations may be perfect theoretically, but I must believe that when manure is distributed over the surface of land, there is loss from exposure and evaporation. There is something that results from the evaporation of solid manure, that science, so far as I know, does not account for. If the evaporation be simply pure water, there would arise no offensive odor. You may ride along the shore of a pond, or line of a river at any time, and you cannot detect the least offensive smell, there is perfect freedom from it. But just ride along by a newly manured field, when the air is so impregnated with foul, disease-breeding matter that you will hold your breath till you get past it. I think you would easily and readily conclude there was something besides pure water arising from that field.

Leaving these matters in the hands of the chemist, what we have to do is with facts drawn from personal experience, and I am quite sure that my brother farmers will agree with me, that covering manure is far better than leaving it exposed on the surface.

Naturally there is no soil deterioration. In nature, when everything that is produced from the soil falls back and decays thereon, there is no loss, no gain, the soil is just holding its own. It is only when we fail to replace what our crops have removed, that soil fertility deteriorates. In order to keep it in the condition it came to us from the hands of the Creator, the elements of fertility abstracted from the soil by cropping must be fully restored.

Farm-yard manure is a perfect fertilizer, certainly for the farm from which it is made, and the only one the farmer has at his command. In returning this to the land, we are replacing what it has previously produced, except what has been sold from the crops, and more or less waste, which cannot be wholly prevented. This deficiency must be supplied from outside sources. What is consumed in the family is returned in the night soil.

Now, how shall this manure be applied so that the soil shall receive the greatest benefit from it? Put it *in* the soil, not *on* it.

In the first place, I would plow the ground, then apply the dressing evenly over the surface, and cover it in the soil, either by shoal replowing, or using a disc harrow, which will do the work very well by setting the discs at a pretty sharp angle. I would plow first, because the soil should be loosened to a greater depth than I would cover the manure. I attach great importance to covering the manure, because a lump of dry dung on the surface is of no more value than a block of wood, for the time being, at least.

At the time manure is excreted, it is a whole manure; that is, its properties are all present, and the sooner it is covered in the ground after, the better, as there is more or less loss from subsequent exposure and exhalation.

When the manure and soil are thoroughly pulverized and mixed up together, the ground is in good condition for any farm crop, which may be cultivated in rotation through two, three or more years, seeding down to grass the last. If the land has been kept well dressed, it is now in good condition to produce four or five good crops of hay, when it should again be plowed, and rotated with crops for which it is best adapted, and then put into grass as before. By some system of rotation, the soil is resting, and relieved from the heavy strain of a continuous one-crop system.

In seeding down to grass, farmers mix timothy and clover, and sometimes, for clayey soils, add red-top to make a turf, which is essential on all mowing fields. As clover mostly disappears after the first cutting, farmers depend almost entirely upon timothy and red-top for their staple crop. If the seed should all grow, one peck of timothy would be sufficient for an acre with the red-top and clover added; but as we are not sure that some of it may not be so old as to have lost its vitality, it is safer to use one-half a bushel, with the usual quantity of other seed.

Three varieties of clover are grown, the northern, the alsike and pea-vine. The pea-vine is not grown to any great extent, except for soiling. It is too coarse for hay. Many mix the other kinds together and sow with the grass seed. Alsike makes a good quality of hay, and is not objectionable in the market.

Before the seed is sown, the ground should be made as smooth as can be, and the soil fine. Now sow the seed and cover with a light bush, or press it into the soil with a roller. If sown on a rough, coarse surface, and harrowed in, as some do, a large percentage of the seed will be covered so deep that it will not germinate. It should not be covered more than one-quarter to one-half an inch.

Stirring the ground, disintegrating it, renders it better for the growing of any crop. The more open, porous, the soil can be made, the freer the air will circulate, and the easier for plant roots to make their way through it after food. Solid ground, as a travelled road, may defy the roots of any plant to penetrate it. Some soils, by the action of heat, become solid, as a mixture of clay and sand, when subjected to heat, become brick. All soils, by the action of cold, become solid. If it were possible to hold a plot of farm ground in as solid condition through the summer, no plant could grow on it, no wet could penetrate it. Why? Not for lack of soil, not for lack of plant nutrients, but simply because the food is locked up in the solid soil, and the plant might starve to death in the midst of abundance of food.

Of course, no such cases would ever occur, and I only mention them to illustrate the point I wish to make, viz: that vegetation will not thrive so well in a compact soil, as in a light, porous one.

The natural tendency of newly plowed ground is to pack, and the loose, open surface soil, will become so compact in a few years, that it will require a crow-bar and considerable force to make a hole in it; when, at first, a stick could be easily forced into it with one hand. So, it is seen, there are gradations of solidity in soils from loose to compact. The first crops after seeding are always best, not alone because of more fertility, but also, because of a looser condition of the soil.

Besides a natural tendency, there are other causes that are compacting the ground every year. The wheels of the mowing machine, the horse-rake, the cart, and the tramp of horses are pressing the surface into closer compactness every season; so that in taking off four or five crops of hay, there is scarcely a square foot of the entire mowing fields, that has not been subjected to the pressure of wheels or the tramp of horses.

Besides loosening the ground, there are other reasons that may be urged in favor of plowing. The soil needs to be disintegrated, mixed up, readjusted, if the term is applicable. The several crops grown upon it, have not drawn upon its resources alike over the whole field. Some spots have produced more than others; and, it may be that others nearly bare, have contributed very little towards the growth of what has been taken off. The number of plowings and harrowings which will be necessary before it is again seeded to grass, will pretty thoroughly disintegrate and mix the soil, thus leaving it in a well balanced condition for several successive crops of hay.

Cultivating land keeps it from compacting, which is another cogent reason against surface-dressing. Keep the soil light and open, if you want to realize the best results from your labor.

The best time to cut grass for hay has not been definitely settled. If it were so, it could not all be cut at just the right time. Haying runs through two to four weeks; so, of necessity, some must be cut before it is in the best condition, and some after. When three or more weeks are devoted to haying, it will be none too early to begin just before the first blossoms appear.

The heaviest hay is matured hay, ripe hay; and it is contended that ripe hay, like any other ripe thing, has the most nutriment in it. This would seem to be true. On the other hand, it is claimed that cattle do not relish ripe hay so well as early-cut, and that a less percentage is digestible. It would seem that the best time to cut grass is when it has attained its full growth.

The best hay is that which is got quickly. In good weather, unless the grass is green and heavy, as it is the first of haying, it should be in mow the second day after cutting. At the last of haying, the weather being favorable, it may be cut and in barn the same day.

A great deal of hay is damaged by injudicious handling, by being overmade and undermade. It used to be dried by exposure to the sun and wind till nearly all the juices were dried out of it, so that a wisp would break in one's hands; but now, you can wring water out of it, and yet, if dry and hot it may go into the mow safely. In this condition, it may hold from thirty to thirty-five per cent of moisture.

It is my practice not to leave any cut grass uncocked over night unless it is mown after four o'clock, which is done when the indications are good for favorable weather the following day. That in cock sweats during the night, and a little opening and drying the next day puts it in the best condition for the barn and for hay. After hay is wilted, partially made, a rain, or even the dew, will color it so as to injure its sale in the market, but does not really affect its value unless exposed to a storm.

When the indications are favorable for the following day, there is no necessity for being very particular about making the cocks, the object being to sweat the hay, and keep it from the dew. But when the wind is south or southeast, the sky overcast, and a storm threatening, I tell my men to be very particular to start the cock not larger than a bushel basket, and build it up by successive forkfuls, each one overlapping and protecting the preceding. Each forkful acts like an umbrella, so that when the cock is finished, it will stand through a long storm without getting much wet. It is seen that the hay is so well protected, that the water will run off, leaving the middle and bottom dry, except a narrow rim on the outside. After a little practice, it will astonish one to see how rapidly they can be put up.

If the bottom is rolled together carefully, as is generally the case, it is wide and flat. A forkful or two completes the cock, which is in no condition to withstand a storm. The water, instead of running down over the sides, as in the first case, will go right down through it to the bottom, and wet the entire cock, if the storm be long. However well made, do not put hay in the mow wet, unless you want it to come out mouldy.

Intelligence lies at the foundation of successful agriculture, and it must, like other trades, be carried on on business principles. Success in anything is the result of intelligence, of purpose, of energy and persistence.

It used to be thought that anybody, not an absolute idiot, could be a farmer. He might, indeed, shovel muck or gravel, and pick stones; but it is questionable whether in work that required no skill, a little intelligence might not aid in making the work lighter. There are some kinds of work that do not require a great amount of skill in their performance, but even such work can be accomplished with greater ease, and in less time, when done intelligently. Intelligence has now become a necessity in all varieties of farming operations. It leads to economy, economy lessens expense, and so far as it affects our business, insures success. Intelligence then, we say, lies at the foundation of success.

We are admonished to get out of the old, deep worn ruts of former times. By this, it is not understood that our fathers were ignorant men. They were acting up to the light of their times; and, if they were not educated farmers, they were, at least, practical ones, and men of good judgment, as compared with men of the present day.

But methods have changed, and it is doubtful if they could succeed to-day under the methods in vogue in their time. The land was then new and fertile, and it needed only to be cleared, and the seed covered in the soil to insure a good crop. Conditions have changed, and changes must be made to suit the conditions.

The necessity of intelligence in farm work is now greater than ever before; indeed, it has become indispensable. Thought and intelligence must go hand in hand. Learning without thought is mere superficial knowledge, and is of little worth practically. Thought, without intellectual, mental knowledge, is of little avail in physical labor, or scientific experiment and work. Thinking and reasoning must go together.

The farmer must have the ability, and the consciousness of this ability for achievement, and then the way is open for the grand purpose of life, while success lies all along to final achievement. Final achievement! There is no final achievement. No man was ever yet fully satisfied with any attainment when there was a higher within his reach attainable; and even that might fail to satisfy an ambition so far reaching as that of Alexander the Great, so called. He had conquered the world, he had reached the maximum of human power and glory, but his ambition was so far from being satisfied, that, history relates, he sat down on a stone and wept because he had not power to reach the skies and conquer the worlds above. Great? Yes, he was a great conquerer, a great robber, a great murderer. His life, from the siege of Tyre till his death, was fully of rapine and cruelty. He died, while yet in the prime of manhood, in a drunken carousal.

We said there is no final achievement, man dies without attaining it. But there is an achievement within the reach of all, a worthy achievement to which we all ought to aspire; but we cannot jump into it at a bound; it must be gained slowly, step by step, and some of them may be the result of years of toilsome labor; but they are steps gained, and are worth more to us than they cost, and so of more value. An object that is not striven for, that costs nothing, is of but little value to its possessor, and, in the end, may prove his ruin.

Agriculture, as we have before remarked, must be conducted on business principles, which must be thoroughly and practically understood. Buying and selling is not all there is to trading. The trader must know how and when to buy, and how and when to sell. And besides, he must understand all the conditions affecting his business, otherwise the chances are against him.

The farmer, like every other man who depends upon his own personal efforts for a living, looks forward to a specific purpose to be accomplished, and so bends all his energies towards the accomplishment of that purpose. Full well he knows that in these days when every man is doing his utmost to outdo his fellow man. in these days, when the price of farm labor is out of all proportion to the cost of production, full well he knows that success is attained through long years of toil, economy, and it may be, hardships. Nevertheless, inspired and sustained by courage and hope, he steps into the avocation with assurance.

A hill of corn is planted for a purpose, a specific purpose; but that purpose is not secured at once, it is away off. But when the seed is covered in the soil, the first step has been taken towards the end for which he is laboring.

The seed was planted with thoughtfulness and care, and the plant is tended with equal thoughtfulness and care all through its young and middle growth to maturity. In July, the stalks are strong and vigorous, the spindles are growing finely, and the prospect of securing the prime object is favorable. Success, so far, is certain, and is approaching the grand object for which the seed was planted and which will be fully realized, when, finally, he gathers in the golden ears.

All along the line of the farmer's life, his conscious ability is developing itself in yearly achievements, the result of the formation and carrying out of his purposes.

Every farmer should have in view one grand purpose, that of owning his farm unembarrassed, of being independent, and of acquiring a competency that will make life easy and happy. He should aim for nothing less; and though it be within the range of possibilities, he would be quite sure to hit short of his mark if he placed it much higher.

A competency that places a man above the reach of want, and insures him everything necessary to make life pleasant and enjoyable, is all he needs in this world; and this, we think, is within the reach of every intelligent, industrious and economical farmer. But he must work up to it by yearly successes. He can't jump from nothing to competency at a single bound. But, trusting in Providence, he feels conscious of his ability to accomplish, year by year, any purpose where the probabilities are largely in his favor.

The sky is clear overhead, the sun is shining down warmly and pleasantly on his fields, and the birds are singing all around. It is a fine morning about the last of September. The farmer is at work in his field, his hay and grain are safely stored away in the barn, stalks of corn, weighted with golden ears, stand thickly on the ground where they grew, potatoes are being harvested, apples are reddening and yellowing in the orchard above, over across the brook yonder, cattle and sheep are grazing. The grass is green and growing all over the mowing field, assuring him that Nature (God) is working with him and for him, not only to-day, but to-morrow, and always. All this he takes in at one glance, and mentally says: "It is all, by the blessing of God, the result of my labor. My obligations have been met as they became due. I have made improvements on my farm, my buildings are certainly better equipped, and I am approaching the achievement for which I have been, and am still working, an easy condition in life."

This picture is not overdrawn. In the absence of misfortune, to which all are liable, it all follows in the wake of intelligent, industrious, economic farming. He has been, and will be, a success.

In elevating his farm, he has been elevating himself, his family, the neighborhood. He is doing good in the world, and is rising on a permanent basis, personal merit.

Every animal he has sold, every bushel of grain, every bushel of vegetables, every pound of butter and cheese, has added something to the business of the world, increasing physical and mental activity, putting money into somebody's pocket and food into somebody's mouth. This is just what the successful farmer has done and is doing.

The man, who, instead of devoting his time to some useful employment on the farm, is idling it away down at the grocery store, discussing matters that have no elevating features in them, will never rise above zero. Idleness leads only in one direction, downward.

This man has no early lambs to sell, no bushel of grain or vegetables. You can always tell this kind of a farmer when travelling over the country, by signs, just as easily as you would a country tavern of former times, by the big, yellow letters on the sign-board. An old wagon in the door-yard; an open, cold barn back of it; an old hat or cast-off trowsers-leg where a pane of glass ought to be, and a general tumbledown appearance all around.

This man's life has been a miserable failure. He has hung like an incubus on society, and the world would have been better off without him. Thank God, in our day, in the good State of Maine, there are but few of this class. This man had the opportunity to do better, and the ability to achieve it; but he let the opportunities go by, and his ability withers and dies.

I always speak encouragingly for farmers, and in conclusion, let me say: You may go this wide world over, from east to west, from north to south, and you will find no class of men so moral, not to say religious, as farmers; you will find no class of men who have, by their examples, done so much towards elevating the standard of society; or perhaps it may be better put by saying no class of men who have done so much towards lessening the evils of society, as farmers; no class of men who have contributed so much towards the great business of the world, its subsistence and the happiness of mankind, as farmers; in fine you can find no class of men so free from vices, so industrious, so independent, so honest and happy as farmers. Stick to the farm, and thank God you are farmers.

INDUSTRIAL EDUCATION IN MAINE.

STENOGRAPHIC REPORT.

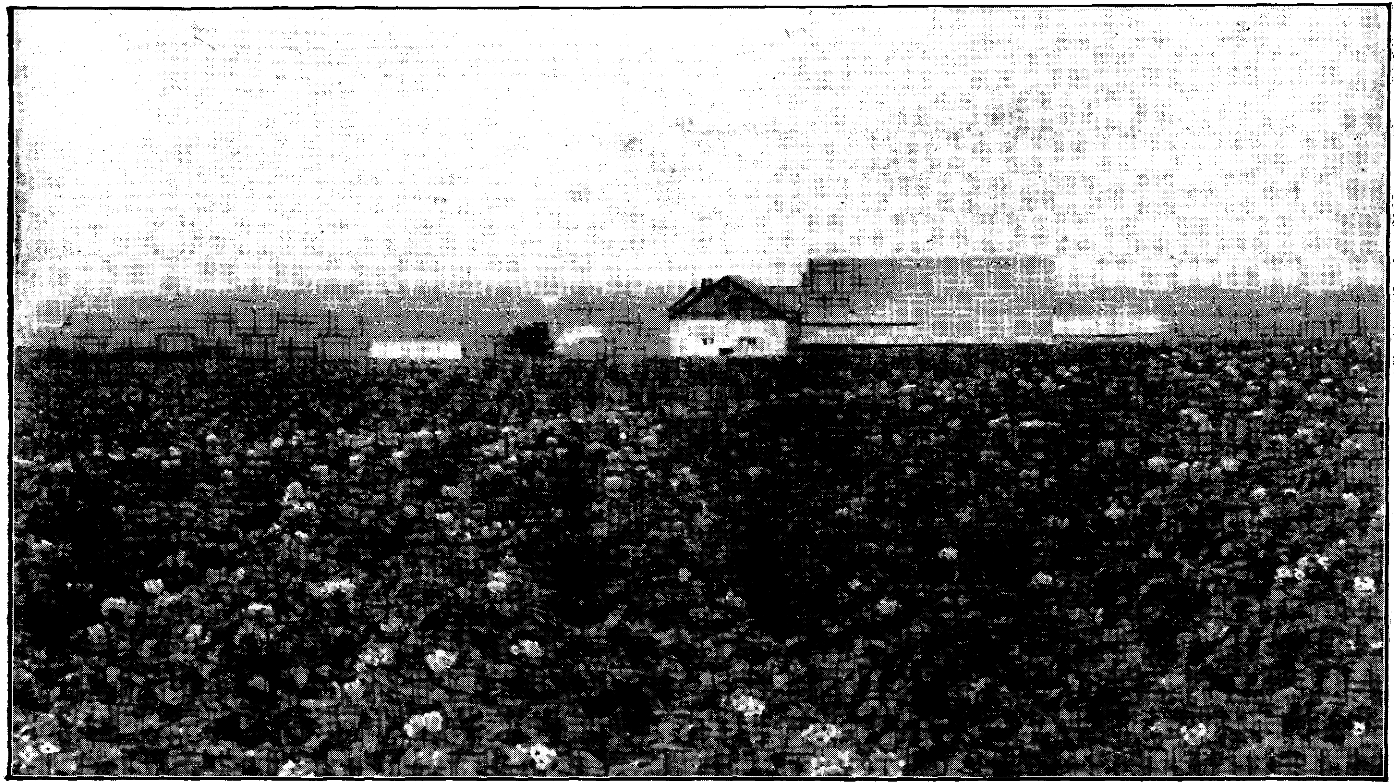
Lecture delivered by Prof. W. H. JORDAN, Director Experiment Station, Maine State College, on State Fair Grounds, Lewiston, September 25, 1894.

The meeting was opened by the President of the Board of Agriculture, Mr. A. W. Gilman; followed by singing by a quartette furnished by Mr. A. R. Smiley. Prof. Jordan was then introduced by Mr. Gilman, and spoke as follows:

Mr. President, Ladies and Gentlemen:—Once on a time there was a parrot in a cage out near a sidewalk. He was a mischievous bird, and as he saw a dog going by he said to the dog "St' boy," and he said it not only once but several times. The dog did not pay much attention at first, but after a while he got mad and went for that parrot, and there was a grand mixture of the dog, parrot, cage and feathers; and after it was all over and Polly had picked himself up and found out "where he was at," he tipped his head up and looked around and made this remark,—"Polly, you have talked too much!" And I have been wondering, friends, whether in coming to you to-night to talk on the subject which I am to talk about, I do not talk too much. I have met some of you quite a good many times, during the past few years in different parts of the State, and we have discussed together a good many things. I am here to-night, however, as a substitute. It is no secret that if possibilities would have allowed, Dr. Harris, the President of our College, would have addressed you instead of myself. As it is, I have come to you to talk about the State College, and I have no apologies to make. I shall never apologize,—as an alumnus of that Institution, or as one of its working force,—for presenting its value, its merits and its opportunities to the people of Maine; because I believe in them, and what I believe in I want you to believe in.

Now we are here at this fair, and I think we have enjoyed it to-day, but one thing certainly impresses us. Counting out all the fakirs and all those things which are inside shows and which I suppose are all right in their place, one thing impresses us; and that is that this is a great industrial exhibit,—it is an exhibit of manufacturing establishments of great variety. It is a place where the people of Maine that are producing something are showing what they are producing. Another thing impresses us, and that is that there is being tremendous progress in these products. When I have been here at the fair before I have either ridden out on a horse car that lost the track every five minutes, or behind a tired horse that excited all my pity; but to-day I have ridden out on the electric car that does not stop for anything, and this one fact has impressed me, as it doubtless has impressed all of you, as an evidence of the progress we are making. And this progress is general,—there is no line of production but that shows great progress. I do not wish to magnify the State College unduly, but I am to speak about industrial education, and the Maine College is the exponent of industrial education in this State; there is no other place where you find it; The State College is intimately connected with the lines of progress in the State of Maine. I do not propose to say that nothing else is important, but I do propose to say that the State College is of vast importance along the lines of industrial progress, and I think the people of the State are beginning to appreciate that fact.

I have just received a telegram from Dr. Harris,—I asked him to send it to me because I wanted to know something about our new class,—and he telegraphs me that the freshman class already



POTATO FIELD OF FRED COLLINS, MARS HILL, AROOSTOOK COUNTY, ME.

numbers eighty-four. That is an evidence that the people of the State are beginning to appreciate the fact that the institution has something of value for its young men,—and young women, too; the only difficulty is we have no place to care for them all. Now the reason why the Maine State College is so intimately connected with the progress of the State, is because the industries are taking on new characteristics.

For instance:—I am an apple raiser, an orchardist. For years we have had apple scab, but we have taken it as we must and submitted. Now we are using scientific means for combating that pest. We used to have certain insects, as we have now; now we are using scientific means for their extermination. In every branch of industry new means are being used, and means that involve a knowledge of science, and the man who is to succeed in the future must be an entirely different man from the man who has succeeded in the remote past, or even in the near past, because he must be acquainted with a different class of facts,—he must be differently equipped. Now it is possible that there are some here who will say "This is nonsense;" I doubt it, yet there may be some.

I remember as a boy I used to hear the prospects of young people who got married discussed. Young Mr. Blank married young Miss Smith, and the old people,—and younger people,—discussed it, whether it was according to their notions or not; and one of the things we always heard said was "He is a good worker and she is a good worker and they will succeed." There is much good sense in that remark; industry is an essential condition of success anywhere and everywhere, but it no longer remains true as it did when we were hewing out farms and had a virgin soil, that mere labor is the great condition of success The dairyman of to-day who is to succeed must be more than a good worker, he must be a man who knows a certain class of facts. The orchardist of to-day who is to succeed must be more than a diligent man; he must be a student of his business, and not only of his business as he finds it in his orchard but of his business as he finds it on paper. He must learn what other men do, what science has discovered, and what the experience of the best orchardists teaches. The man who is to be a producer of any class of products on the farm must be a man who is more than a man of brawn, he must be a man of brain.

It will always be true that the man who combines industry with intelligence will distance the man who merely depends upon brawn for his success. And these are the reasons why an institution that is attempting, at least as best it can, to furnish to the young men and women of the State directly as students the best information that can be had along these industrial lines, and to the older people of the State the best information it can give by popular lectures, is intimately connected not only with the agriculture of the State in its progress but with the manufacturing industries of the State. And so that is one reason why at this great industrial exhibition I propose to say something to you about the Maine State College. I suppose there are those here who remember the years of 1861 and 1862. That was when our great Civil War began, and we stood still in awe at what was before us. I have thought a great many times, and the thought has always impressed me very much, of the fact that our national legislature paused in the midst of preparing for a great war, yea, not only preparing for but conducting a great war, when it seemed as though this Union might be dismembered, paused with a faith that we can now regard as a grand faith, to legislate into existence the most beneficient scheme of special education which this country has ever organized. Imagine it, friends! Civil War was then at one of its darkest points, and yet our country legislated into existence the State Colleges of Agriculture and the Mechanic Arts. Did it not show an exalted faith that this Union would be maintained, and that the people would cherish these institutions? And it seems to me, friends, that the very stress of circumstances, the demands that were then made upon our material prosperity, was one of the reasons why those men, who were wise, legislated into existence this system of education.

The use of science in the arts had begun in a small way; the benefits of knowledge as applied to the industries were beginning to be felt by the best informed; and Mr. Morrill, the father of that bill, and others who thought with him said, "We want the farms and workshops to be touched by this magic wand," and so they gave thousands and thousands of acres of public land that the State colleges at Orono and in the other states of the Union might be brought into existence. Since that time Congress has turned its attention twice to these institutions; first to say "We will give the Colleges of Agriculture and the Mechanic Arts $15.000 for the purpose of experiment and investigation;" and secondly, to say to the colleges "We will give you $15,000 the first year, $16,000 the next year, and $1,000 additional for the next ten years until the sum becomes $25,000, as a permanent endowment for the education of young men and women in science and the affairs of life.

The farmers and mechanics of this country have no reason to complain as to what their government has done for them in this direction. No government has so magnificently endowed institutions devoted to industry as this government. I want to speak for a moment on a point concerning which there is some misapprehension on the part of many. The United States has no direct control over the college at Orono, but simply requires a report as to how its funds are expended. The institution is in the hands of trustees appointed by the governor, and is responsible to the governor and the trustees; so it is a State institution and not a government institution.

We are going to show you some pictures in a few moments, but first I want to give a summary of what we have at the college. We have received, as a permanent endowment, \$230,000, \$130,000 coming from the sale of land and \$100,000 presented through the will of ex-Governor Coburn, one of the wisest friends the institution ever had. We have received from the State in the way of appropriations \$250,000 in the quarter of a century that the institution has existed. We have an income of \$57,000,—next year it will be \$58,000, and the maximum will be something over \$60,000.

We have eighteen buildings; in the faculty of the institution and connected with the Experiment Station there are twenty-two men; there are eight full courses of study offered to the sons and daughters of Maine; there are four short courses offered to the farmers' sons and daughters who wish for instruction in matters especially pertaining to agriculture; then there are what I might speak of as extension courses which you know about,—what we might perhaps call local classes in the different villages of the State to just the extent that we have the time to attend to them. That is just a brief summary of the institution. It may occur to somebody to ask "Why this expense? \$57,000 a year, eighteen buildings to be maintained, twenty-two men to be kept at work! Why this expense? Does it pay?" Well, my friends, if we were to take the view of that that some do from the mere dollar and cent side, I could not demonstrate to you to-night that it pays. I could not demonstrate to you that our common schools pay on the dollar and cent basis; I could give you no mathematical proof of it. But I want to assure you, friends, that our greatness, our prosperity and our standing as a State do not depend upon our material wealth. The greatness of this State consists in its men and women. The greatness of this State consists in the thoughts we have, as men and women; in the breadth of view we have; in our power to think; in our ability to be and to do. And no state ever makes a mistake when it builds institutions that have to do with education, even if you cannot trace out a single penny in return from the material side. We think from the wrong side when we say a thing is a failure because it does not produce a dollar. I know money is essential, I know it is well to have the luxuries of life, I know that property goes along with self respect and education and with the luxuries that beautify and ennoble life; but any institution that makes us wiser and broader in our thinking, and gives us a better understanding of what we are and where we are and what we are to do, should rank among the greatest institutions and is never a mistake. So the State College is one of the institutions of this State which we should foster because of its relation to our greatness as a people of intelligence. There is a problem involved in this matter of education which I want to speak of. In order to illustrate what I mean I will ask your patience if I say something about the institutions that existed before the State College of Agriculture. Fifty years ago a boy went to Colby, Bowdoin, or to some other of our literary institutions, and what was he taught? That young man was developed largely in the power of thinking and of expressing his thoughts. Now I appeal to you, friends, is not that a great thing? Who were the men that we remember in this country in its political and industrial crises but men who by their power of thought, and especially by their power of expression to the American people from the platform and with the pen, have controlled affairs. We remember Daniel Webster, we remember Abraham Lincoln, we remember those men who had the ability to think clearly and to move the masses by their eloquent appeals from the platform. It is a power which no man should ignore; it is a power which every man should desire to have, and having it should cherish and use it to the best of his ability. But we said in 1862 "We are not educating in the industries; we are simply educating to gain the use of language, to appreciate literature and to understand the beautiful, but the boys are not being educate d to think clearly in their business and we will turn our attention to that," and it was a great thing to do.

When our boys come to Orono this problem presents itself; the boy wishes to become a farmer, a civil engineer or a mechanical engineer,—now what shall we do? I have been fearful that these institutions were likely to overdo the matter and simply give commercial education. Oftentimes in the meetings of the faculty a request comes in from a student;—"I do not wish to take history, literature, political economy, etc., because all this is not going to do me any good; I wish to take work in the workshop. I shall not use German, history and literature, but I am to be an engineer and I want to know about engineering." The danger is that the man will not be trained to think and write and speak, but that he will simply be a man trained in the things pertaining to a business.

Now I assure you, friends, that when any industry, whether it is the farm or any other industry, makes a demand upon any educational institution to simply train men along those lines which enable them to do things on the farm and in the workshop and not to think and to express themselves clearly and forcibly they make a profound mistake. If agriculture is ever to come to the front it will be through its men who can make themselves felt on the platform and in literature, and the ability to speak and write comes from the study of language, from the study of literature, from the study of history; and as citizens, men have insight and ability to conduct themselves in trying circumstances according as they know political economy and those things that are related to government. And now what do we try to do? We try to make a compromise; we try to give the boy enough in four years' training in language, history and political economy to make him a man who can face his fellow men with a thought and drive it home, and a man who knows the duties of citizenship and who, if he is called upon to represent his industry, his profession, his class of workers, anywhere, can do it with the same credit that the professional man has been able to do in the days that are past. We do not propose, unless we are driven to it, to degrade any calling, and especially that to which the agriculturist is called, by saying that he has not the right to the same attributes of mind as any other class. I tell you, my friends, the dollar and cent side of education, whether in agriculture or anywhere else, is a degrading idea if you do not carry along with it the ennoblement of the man himself. And so let no person within the sound of my voice ever disparage the work of an institution in so far as it is trying to cultivate the man. Our civilization is made up of our men, not of our farms. I have no apologies to make. I simply say this in the way of explanation because the college teaches some things that the other colleges have taught.

I will speak of one other thing, and then call upon Mr. Colby to do his part of the work. I am going to talk frankly because it is no use to talk any other way. There are eighty-four men in our new freshman class; so far there are two who have decided to take the course in agriculture. We are spending more money at the State College to-day in the department of agriculture than in any other department in the institution besides the $15,000 a year for the experiment station. We have more teachers interested in the course in agriculture than in any other course. We spent money enough last fall advertising our short course to have paid the expenses of quite a number of students through that short course; we had three students. Now I want to thank the farmers of Maine for the support they have given our institution; for the cordial welcome they have given its men; for the sympathy they have shown; and for the kindly feeling that exists between the college and the people all over the State. I am glad of it, I am proud of it; but the institution cannot fulfil its mission to the farming class without there is cooperation. We cannot say to the boy "you must follow agriculture" and until the people of this State have as much faith in agriculture as they have in measuring tape behind the counter, or in any other calling young men will not seek the higher walks of agriculture. Never until that time comes will we have the right number of students in that course at the State College; and I am saying this to-night because I mean it. I understand some of the difficulties connected with agriculture, but I have watched our graduates,—I know about most of them because I went to the college before the first class graduated and have been at the institution quite a good many years. We have graduated a good many engineers, and some of them have attained distinction. The chief engineer of the Maine Central Railroad is one of our graduates, and we have a graduate in the West who has done one of the most able pieces of engineering that has been done in the country. But those are exceptions. There are graduates from the engineering course who are not so well off as the well-to-do farmer of the State.

There are boys that otherwise would measure tape or would go into a small store, or would do a thousand and one other things that are better off to train themselves for useful citizens and continue dairying and fruit growing in content and prosperity. And all such young men as that can no better invest $1000 than in coming to the State College. Now, friends, we will do what we can; we are at work all the time, but you have your part to do; and if you have faith in yourselves, and if you have faith in us as you say you have, for which we are glad, you must let us have some of your boys as evidence of your faith.

Now I am going to ask Mr. Colby to show you something of the State College. The picture on the screen now is a view of the college from the opposite side of the Stillwater river. You understand that the college is on an island; if it were not for some bridges we would have to swim or go in boats. It was formerly called Marsh island,—and is now for that matter. The next view shows the college from across the river. One of the buildings cannot be seen; that is a building in which part of the boys live. We now see the campus in front of the buildings, and the buildings down as far as the president's house, including the water tower which holds the water that gives fire protection and water supply to all the buildings. Another view shows the college diagonally from up the river, and is presented merely as giving you a view which the people on the other side of the river get of the institution. We think we have a beautiful campus. The building now on the screen is the college chapel. There the boys are gathered once a day for religious exercises and to receive such announcements as the president of the college has to make to them. Unless a boy goes there with the foundations of a good character, I do not think anything we might say to him would have very much influence. He must remember the teachings received from his father and mother. We have another view from the President's house looking down the street that runs in front of Wingate Hall. We think this one of the best views of the campus. Here we have what those of you who have been there will recognize as the farm buildings, showing the house, barn, and Experiment Station barn. The house is now occupied by members of the faculty.

The next view is the dairy building; now we propose this winter to offer a four weeks course in dairying in which we expect to teach the students the use of the separator, the extractor, and all the dairy machinery which is inside this building. A four weeks course, the expense of which we propose to make just $15.00. We talk about the fact that Wisconsin has so many students in its dairy institution,—do we know that the law compels all the proprietors to employ as managers of their creameries graduates of this institution? Now if there was even a sentiment in this State that called for trained men to go into our butter factories we would have more dairy students. Without disparaging the factories, in my travels last winter I arrived at the conclusion that there was need of good training on the part of the men employed. Now we see something of the interior, the Russian separator, the butter extractor. We propose to take the boys this winter and give them a training in the use of those utensils, and also a training in cheese making, as we have a room for cheese making in one end of the building.

The next view is the forcing houses. Since this view was taken we have built another house sixty-five feet long, and another the same length as this one. We have one of the best forcing house plants connected with any institution in the country. It is in charge of Prof. Munson and his assistant, Mr. Gould, one of the boys who took the course in agriculture at the college and is doing good work. The next view will show you something which at the time we considered very fine,—the first crop of tomatoes which we grew under glass.

The vines are trained on strings which reach to the roof and the tomatoes are hanging like apples on trees. The boys are taught what to do and how to do it in this forcing house. The building now before you is a building which I am very well acquainted with,—that is the Experiment Station. You have a view of the office from which our 9,000 bulletins are mailed, also a small laboratory, and the main laboratory where the station chemists do the analyzing connected with our experiments. We have a very efficient laboratory for that kind of work. The building in the view before you now is Wingate Hall, which was the last building erected.

The building in the next view is one which we think is a very good one,—the building devoted to the uses of the mechanical and civil engineering departments, the department of mechanical engineering having one side and that of civil engineering the other. We have two fine drawing rooms in the upper part of the building; on the next floor are recitation, and below are the designing rooms.

We will now show you Prof. Hamlin himself. Prof. Hamlin was a graduate in 1873, and has been connected with the Institution ever since. He is now engineer of the city of Bangor and has had some very difficult work to do in making hydraulic surveys, etc. He has been the instructor of many of the boys who have gone out to work on the railroads, many of them being in the State of Maine. The next view shows the interior of one of those big drawing rooms in Wingate Hall; and the next a view in Prof. Hamlin's special room for designing. The tables are arranged so that the tops can be tipped at any angle, and there the students do the drawing connected with their business. For instance; they go out and make a survey for a railroad and come in there and do the drawing connected with it. We are also shown some of the boys which he has under his instruction. The building in view now upon the screen is Oak Hall, where many a boy has been homesick. I remember when I was a student (if Mr. Colby will give me time to tell a little story) a fellow went to the Institution the same term I did who was a good boy but had not been away from home. I do not tell this to make fun of him but because it was very laughable. We noticed the first day at dinner that he was crying. Well, boys like that never get very much sympathy. I suppose college boys are apt to appear hard hearted, but when it is a question of real sympathy and help there are none more kind hearted after all. They took a notion to quiz this fellow, and asked him what he was crying about. Of course he was not willing to admit the real cause for his tears, and so said he was crying because the beef was tough. I did not much blame him.

The view next presented shows the workshop of the mechanic arts department; on the lower floor is the iron machinery, and up stairs is the wood working machinery. We are not proud of this building, but sometime we are going to ask for $50,000 to build a new one. The view before you is the forging room, showing the moulds in which the castings are made; the furnace is seen at the back. Castings have been made very successfully there by the students after some instruction. We see the various forges and the pipes which carry off the smoke. The blast is furnished by a blower, as well as the ventilation of the room. Those of you who have been up in the second story of the hall to-day have seen some of the work of the forges. In this room are several thousand dollars worth of machinery to be used by the students. We need a much better building for this machinery.

We will now show you the professor of mechanical engineering, Prof. Flint, a Maine boy, who grew up in Cumberland county. He worked in a saw mill as a youngster, and came down to the State College because he wanted to know all the principles involved in mechanical engineering; and he learned so much and did so well, that he has come to be the head of the department.

We have another general view of the campus which simply shows it from another point, giving the corner of Wingate Hall and the chemical laboratory where the students take their instruction in chemistry and are trained in their analytical work,—in learning how to analyze manures, fertilizers, foods, etc. The next view shows the weighing room, and the balances which the students use for weighing substances. We have a number of these balances for use in this work. We now show you the class in chemistry, and Prof. Aubert. Around him are bottles, chemicals and apparatus, and the students listening with close attention,—as they always do to anything he says to them. Prof. Aubert's mother tongue is French. Some of our greatest chemists are of that nationality.

In the next view is shown the mineralogical room where the students learn to recognize minerals by testing them chemically. Prof. Aubert is here shown to better advantage than in the position in which you saw him before; and (you will excuse me for saying this, because I think a good deal of my friends) every man who knows him knows a gentleman. The building in the view before you is devoted quite largely to the instruction of students who enter the agricultural course,—it is Coburn Hall; and on the floor below are the rooms formerly occupied by Prof. Balentine, and which I shall have the honor of occupying in the future.

On one side are the physical laboratory and the natural history rooms where the students study botany, physiology and comparative anatomy. We see the museum with cases containing birds, animals, and other things which are necessary to the study of animal life; and up stairs are the galleries containing the mineral and geological specimens. Here also is the botanical laboratory of which Prof. Harvey has control, and where the students study plants. In this laboratory are cases containing one of the best botanical collections in the State of Maine,—probably the best. We had a gift of some 14,000 specimens for this collection. The next view shows the class in physics I judge, because I see Prof. Stevens' picture. We have gone back for a moment to Wingate Hall, showing the physical lecture room and Prof. Stevens standing at one side. We also see the physical laboratory where the boys do work in physics, similar to the analytical work in chemistry; they learn to measure such things as the length of sound waves, to obtain the specific gravity of solids, etc.

Prof. Stevens, who has been with us not very long, comes to us from the University of Rochester, N. Y., and teaches physics. He is, too, prominently connected with the new course of electrical engineering. He has put a great deal of energy into his work, and seems to be popular with the boys.

We have now a view of the library, which contains several thousand volumes. It is open to the students at nearly all hours of the day, and many of them spend a great deal of time there reading and looking up special subjects in connection with their studies at the College.

Here is a picture of the first president of the college, Dr. Allen. No man who was a student when he was there but has a profound regard for Dr. Allen. He loved young men and put his soul into his work for them. The next view shows the President's house, taken since it was partially burned. It has been somewhat remodeled, and is now the home of our new President, Dr. Harris. Over in the corner is Dr. Harris' private room where many boys are likely to go when they do not wish to,—go to have a little talk with him about something that has happened.

The building now on the screen is one of the houses that stood on the college farm when it was bought by the town of Orono and presented to the college. The house is occupied by the members of a college society, and they live in the utmost harmony. We have no cases of discipline with those boys who live in a house for the care of which they are responsible.

One of the features of our Institute is a military drill, and we have a view of the boys in the order of march. The instructor is Lieutenant Hersey, a man who has been there three years, and we have succeeded in getting an extension to the fourth. He not only instructs in military science, but looks after the students' physical welfare and development. We also see the students at their annual encampment. This year they are invited to the city of Portland to make their encampment; they were last year at Searsport.

These cadets are inspected annually by the United States Government. It sends an inspector every year to the Maine State College to see what its officer is doing, and Lieutenant Hersey reports that the inspector said to him that he should rank the Maine State College first in the United States in the efficiency of its military department.

The next picture is Lieutenant Hersey, Dr. Harris and some of the students; and the next shows our foot ball team. And then we turn again to the first view, which closes the exhibit.

Now, I want to say just one word. There is one building which we have not seen because it is not there, and that is the gymnasium. We asked last winter for $25,000 for a gymnasium, and we shall continue asking. Here let me say just a word about what a gymnasium is going to do, and I think in just two minutes I shall convince you that it is one of the most important buildings from the farmers' standpoint even. The public has a sort of an idea that it is a place to determine how much a boy can lift and how far he can jump. But it is a place for the development of a boy physically, and if there is any class of boys that need a gymnasium it is the farmers' sons. There are more boys who go with their arms too far forward and shoulders bent, and who have spinal curvature, among the farmers' sons than in any other class. When a boy is placed there under the supervision of Lieutenant Hersey every physical defect is discovered, and when we have a gymnasium we shall put him under a course of training which will rectify that physical error so far as possible.

I wish you could see the difference in the boy who has worked hard and stoops a little and walks not gracefully, after Lieutenant Hersey has had him a year or two. He walks erect, he is straight, he is a changed boy. Physical culture is fundamental to mental culture and we very much want that gymnasium.

Friends, I am very much obliged to you for your kind attention. Next year we are to have another field day. We propose to have special trains that will go down in the morning and come back at night, and we shall be glad to see you all from whatever part of the State you come. We fed 1,700 last year, and we will feed 3,000 next year if they will come. We will give you all a hearty welcome."

The meeting was closed by singing by the quartette.

THE ORCHARD.

Prof. W. M. Munson, State College, Orono.

Within the limits to which I shall hope to confine myself it will be impossible to give more than a mere outline of the principles of orcharding. There will necessarily be many important points that will not be touched upon, but if thought on the subject shall be aroused, and discussion concerning ways and methods instituted, the desired end will be accomplished.

Each person must *think* and *act* for himself. It was the blind following of dogmas, often propounded by mere theorists that brought "book farming" into such disrepute a few years ago. So let us think for ourselves, and act according to our best judgment in the light of the experience of others and our own observation.

In speaking of orchard culture I shall take the apple as the type and then briefly refer to some of the other orchard fruits. The general features demanding attention are:

1st. Selection of site.
2nd. Soil—character and preparation.
3d. Choice of varieties.
4th. Character of the trees.
5th. Starting the orchard.
6th. After management—culture, pruning, etc.
7th. Harvesting.
8th. Marketing.

THE SITE.

The principal questions to consider in selecting a site for an orchard, aside from the soil, are: 1st. Liability to late spring frosts; 2nd. Prevailing winds; 3d. Convenience.

To avoid danger from frosts, choose land which is somewhat rolling; for cold air like cold water is heavier than warm, and always has a tendency to flow down hill. It is not uncommon to find an orchard on a hill side giving a full crop while trees in the neighboring valley are barren. Buds are but fruit and branches in embryo, and at certain stages are very tender.

If possible, select a site which is protected from the prevailing winds by some natural object,—as a hill or a belt of timber. The advantage of wind-breaks in the saving of fruit and preserving of the trees during our frequent autumn gales, can hardly be over-estimated. If no natural wind-break is available, it is advisable to provide an artificial belt of timber at the time of setting the orchard. For this purpose the silver maple and Norway spruce make a good combination. A certain amount of circulation is desirable, and the best wind-break is one which sifts the wind rather than one which stops it. If the air cannot go through, it will go over and strike the orchard farther on. An illustration of the principle may be seen in comparing the effects of a picket fence and a stone wall on the formation of snow-drifts.

THE SOIL.

The soil for the orchard will depend on the kind of trees to be planted. Apples and pears do best on strong, deep loam, with rather heavy sub-soil containing sufficient gravel to make it porous. As a rule, such soils will produce hardier, more vigorous trees, better flavored and better keeping fruits. Rocky hillsides covered with strong loam but so thickly strewn with granite boulders as to be untillable, often produce the very best results. Limestone regions also, as a rule, produce good apple orchards.

A good supply of organic matter in the soil is essential, but rich bottom lands are not usually the best for orchards. The trees make a rank, watery growth, are less fruitful, are more liable to winter kill and more susceptible to blight.

The preparation of the soil should receive very careful attention. This is a fundamental operation and can be performed but once. First of all attend to the drainage. Natural drainage is best, but in lieu of that put in a thorough system of tile drains. Trees are very impatient of wet feet, and soon show their resentment if compelled to stand in water-soaked land.

Look carefully after the mechanical preparation of the soil. It is a good plan to grow some hoed crop, as corn or potatoes on the land the year previous to setting the trees. In heavy soils the use of the subsoil plow is always advisable. Late in the fall plow deeply and at the same time work in a good dressing of stable manure. In case the land is in heavy sod, the plowing should be done in August, that the turf may have time to decay. Do not harrow in the fall. The alternate freezing and thawing of winter will greatly aid in rendering stiff soils friable, and there should be no more packing of the soil than is absolutely necessary. In the spring cross-plow, harrow thoroughly and roll.

Naturally many orchards must be set on our rocky hills without the careful work suggested. In such cases we must use the more care in setting the trees and see that a thorough mulch is provided.

SELECTION OF VARIETIES.

While there is plenty of time, during the long winter evenings, make a map of the proposed orchard, determine the varieties to be set and the number of each. The choice of varieties will naturally depend on the purpose of the orchard. Many of the best market varieties are not most desirable for home use, (e. g. Ben Davis, Pewaukee, and others of that class.) I venture to say that fully half of the trees set every year are selected on the spur of the moment at the urgent solicitation of some crafty tree agent.

For home use plant trees of a few standard sorts which you know are hardy. Be sure and have a succession, from the early summer varieties through autumn to early and late winter.

In the annual report of the Maine Experiment Station for 1893* may be found a list of the more important fruits of the State with a concise description of each. From the list of apples I would suggest for home use: Yellow Transparent, Oldenburg, Gravenstein and High Top Sweet for summer and autumn, followed by Fameuse or Shiawassee Beauty, Hubbardston, Mother, Rhode Island Greening, Rolfe, Roxbury Russet and Talman Sweet for winter.

For market plant few varieties. Just which sorts will be most profitable will of course depend on the market to which you ship. In general, however, plant few if any early varieties, and not to exceed four or five standard winter sorts. Baldwin, Ben Davis, Northern Spy, Roxbury Russet and Talman Sweet are good where they will grow satisfactorily, but we know there are some localities which seem specially adapted to certain varieties.

When studying the question of varieties it is an excellent plan to make a map of the proposed orchard and indicate the exact location of the several varieties. At the same time prepare a book in which a record of each tree may be preserved, so that when labels are lost or the orchard passes into other hands there may be no confusion. This is very simply done by designating the rows by letters, and the several trees in each row by numbers. Thus

*Annual Report Maine Experiment Station, 1893, pp. 129-144.

any given tree may be readily traced out, as A 2, B 5, D 7, etc. The following diagram and form for record are suggested:

DIAGRAM OF ORCHARD.

	1	2	3	4	5	6	7	etc.
A	*	*	*	*	*	*	*	
B	*	*	*	*	*	*	*	
C	*	*	*	*	*	*	*	
D	*	*	*	*	*	*	*	

ORCHARD RECORD.

Number.	Variety.	Where Obtained.	When Set or Grafted.	Remarks.
A 1.......	Baldwin	Smith & Jones...	May, 1890..	Budded tree, died 1st winter. Replaced May, 1892.
A 2.......	Baldwin	Smith & Jones...	May, 1890..	Top worked on Ben Davis.
* *	* * *	* * *	* * *	* * * * * *
* *	* * *	* * *	* * *	* * * * * *
B 5	Northern Spy .	Johnson	May, 1893..	Top worked on Pewaukee.

ETC. ETC. ETC.

Instead of arranging the varieties in solid blocks as was formerly advocated, it is now thought best to mingle the varieties to a certain extent, to insure more perfect fertilization of the blossoms.

CHARACTER OF THE TREES.

Never practice the false economy of buying second class trees because they are cheap. Poor trees are always expensive in the long run. The best tree is that which has an abundance of fine, fibrous roots and a strong "stocky" stem or trunk. Height at the expense of diameter should be avoided, as such a tree is very liable to become twisted and deformed before fully established. A tree which is injured when young never fully recovers.

With some varieties—notably the Baldwin—it is often a good plan to purchase some strong growing, hardy stock like Ben Davis, Haas or Pewaukee, and top-work. Trees of some named variety are preferable to seedlings because of the greater uniformity.

POTATO FIELD OF BARNEY McLAUGHLIN, LIMESTONE, AROOSTOOK COUNTY, ME.

STARTING THE ORCHARD.

A careless, shiftless person has no business in an orchard at any time. I have seen trees purchased through local agents, carted around the country mile after mile, exposed to drying winds and scorching sun, and then the greatest surprise expressed that after planting they failed to grow. Some people seem unable to realize that nursery stock requires more careful handling than the brush that is removed from the wayside. By their practice they show either inexcusable ignorance or gross carelessness.

A tree is a living thing. It feeds, breathes, grows, multiplies, decays and finally dies. Man, by means of the environment afforded, has an important control over its various functions and conditions. The most critical period in its whole life history is during the first two years. A little care when first planting may save much valuable time and many hard feelings.

As soon as received from the nursery, the trees should be carefully "heeled in." If very dry and much shrivelled, cover the tops as well as the roots with soil and leave for a week or more before planting. On removal to the field it is well to cover the roots with a blanket to prevent drying, and before planting dip them in water. The soil will then adhere and serve as a protection to the delicate fibres. It will be found that dipping in clear water is just as effective as the old fashioned "puddling" so commonly advised.

Cut off all bruised and broken roots with a smooth clean cut from the under side. This will facilitate the formation of the *callus* from which new roots spring. If the root system is small, cut back the top severely, thus reducing the surface for evaporation. (The root system should not be small if the trees are properly handled in the nursery.)

See that the earth in the bottom of the hole is well pulverized and that the hole is large enough so that none of the roots shall be cramped. Comb out the fine roots and work the soil under and among them so that no air space shall be allowed. Tramp the earth firmly about the roots, and if in an exposed situation use stakes to prevent undue swaying in the wind.

AFTER MANAGEMENT.

One of the most certain ways to insure the vigorous growth of a young orchard is to mulch. A dressing of two or three inches of manure or coarse litter for three feet around the base of the tree will prevent the rapid evaporation of soil moisture and preserve uniform conditions of temperature.

Whether an orchard should receive tillage is a disputed question. There is, however, no doubt that during the first few years cultivation is advantageous. Continued stirring of the surface prevents the formation of a hard crust and keeps the soil moist and friable. As a general rule I should consider it advisable to cultivate the orchard for the first ten years, and I doubt if permanent seeding is ever advisable; though some very successful orchards have never been plowed—even previous to planting. In such cases I am inclined to favor the use of hogs in breaking up the turf. I can conceive that in some instances trees that are growing rapidly, and are slow in coming into bearing, may be benefited by seeding the land. It is but an application of the universal principle, "checking growth induces fruitfulness."

In cultivating an orchard it is important to remember that trees require plant food just as much as do other plants, and if double crops are taken off from the land, double amounts of food must be supplied. The soil is the bank in which nature makes deposits for future generations. Each crop that is removed from the soil is a draft of greater or less amount—depending on the nature of the crop. Now banking is poor business if the cash handled is all in disbursements. So then, to maintain our credit with the Bank of Nature, we must make deposits of plant food to meet the demands of the fruit and other crops removed.

It is perhaps unnecessary to call attention to the fact that the root system of a tree extends over an area approximately equal to that of the branches, and that the fine feeding roots are mostly towards the outer part of this area. Even at the present time, however, we occasionally see otherwise intelligent men who make the mistake of applying large amounts of manure close about the base of the tree. This practice may be followed while the orchard is young, but in orchards in full bearing all fertilizers should be distributed over the entire surface of the soil.

The kinds and amounts of fertilizer to employ will naturally vary with local conditions. In general, however, highly nitrogenous manures are not desirable. Wood ashes and ground bone make a very good combination for general use.

PRUNING.

One of the most direct causes of failure in orcharding is that of injudicious pruning. By pruning in one way we may diminish growth; in another way increase it. We may cause a plant to become thick and bushy, or of open habit with long straggling branches. We prune to produce fruit and prune to reduce fruit. So I can not urge too strongly: Never allow an irresponsible man to work in the trees.

The saw and the knife are often used when no reason for such use can be given, except that at certain seasons it is "time to prune." All pruning is theoretically unnatural and injurious to the life of the tree; but on the other hand, a few well developed healthy branches are of more value to the plant as adapted to the uses of man than are double the number which may be crowded together, each in the other's way.

The ideal way of pruning is to depend on "pinching in" terminal shoots and shortening laterals with a good strong knife. In practice, however, a small handsaw is indispensable. If proper care is used from the first there will seldom be large limbs to remove.

Pruning at the time of transplanting and during the first years following is specially important. I have already suggested heading back the trees as they come from the nursery. Care should be used at this time to avoid the formation of crotches, and when practicable the branches should be arranged spirally around a central axis.

Go through the orchard every year and remove all superfluous branches,—such as those that cross, or those that are parallel and near together, or those reaching toward the center of the tree. Aim to keep an open head, but do not take off all the lateral branches leaving long struggling whipstocks. Consider also the habit of the variety. Naturally high headed sorts like Tompkins, County King and Northern Spy require very different treatment from low spreading trees like Rhode Island Greening. If necessary to remove a large branch, as will occasionally be the case in the most carefully managed orchard, make the wound as small as possible, and protect at once with a coat of paint or grafting wax.

As to the proper time for pruning much has been said and written. The best time for removal of dead limbs and small branches is when saw and knife are sharp. But, other things being equal, if there are many large limbs to remove, I usually prefer the month of April. If it is desired to check the growth of the tree and induce the formation of fruit buds, summer pruning may be resorted to.

SPRAYING.

It is not possible at this time to give an extended discussion of the subject of the treatment of insect and fungous enemies of the orchard. It is perhaps enough to say that with the increased competition in fruit-growing and the demand for fruits of higher quality the successful orchardist must keep abreast of the times in the employment of means provided for his benefit. There is no longer any doubt that the proportion of wormy fruit may be greatly reduced by spraying the trees two or three times with Paris green; while it is equally certain that good results follow the use of Bordeaux mixture as a preventive of apple scab. I have given careful attention to this subject for some years and some of the results obtained have been detailed in the annual reports of the Experiment Station* and of the State Pomological Society†.

HARVESTING.

There are at the present time numerous styles of apple pickers that are more or less successful, but about the best one is a careful man in the tree or on a ladder. One of the first principles for a picker to learn is that all fruit should be handled like eggs. Every bruise invites decay, and care in handling will always pay in the long run.

The fruit is borne on miniature branches or "fruit spurs," and it will be observed that between the stem of the fruit and this spur is a distinct joint. Harvesting should always be delayed till this joint will readily separate. If gathered previous to this time the fruit will shrivel, but if left on the trees too long the keeping qualities are impaired.

MARKETING.

The more important points to be borne in mind in successful marketing may be summed up in a very few words.

First of all see that the fruit is properly graded. It is never good policy to ship fruit just as it is harvested—good, bad and

*Rep. Maine Exp. Sta. 1891, p. 99; 1892, p. 92; 1893, p. 124.

†Rep. Maine Pomological Society 1891, p. 71; 1892, p. 67; 1893, p. 82.

indifferent all together. First-class fruit should be strictly first-class, and second-class fruit should be such—all culls being fed to stock or consigned to the refuse heap.

In general use standard packages of the size and form recognized in the market to which you ship. Fancy fruit handled with special care and shipped in fancy packages will often find sale at good prices when the market is glutted with fruit grading as "medium" or even "firsts."

Place your name and guarantee on every package of No. 1 fruit sent from your orchard. Take pride in sustaining a reputation for careful handling and honest packing and in a few years this reputation will always insure sales at top prices.

Probably the majority of fruit growers will depend on a home market for their produce, and unless a man thoroughly understands business methods it is perhaps safer to sell directly to some responsible party. Here, as elsewhere, the man who thinks for himself has the advantage. The man who studies different markets and the conditions affecting them is able to make consignments to different points at the most advantagous times and on the best terms.

In dealing with commission houses let me urge one point: Keep in constant touch with your agent. Do not make a small consignment, and because the price may happen to be high immediately ship a large lot unannounced. Notify your agent when and how much you will ship each time, that he may know what to depend on. Be strictly honest with your agent and the chances are that you will have no trouble. Much of the trouble between shippers and agents is due to carelessness or ignorance on the part of the former.

Without dwelling further on the general principles of orcharding, it may be well to spend a short time with the pear and the plum, which with the apple, form the trio of orchard fruits most important to our State.

THE PEAR.

As is well known there are two very distinct methods of growing pear trees: The "standard" in which seedling pear trees are used as stocks, and the "dwarf" in which desirable varieties are grafted on quince, mountain ash or hawthorn,—the Angers quince being most common.

Standard trees should be planted twenty to twenty-five feet apart each way and treated in every way like apples. Dwarf pears, on the other hand, require very different treatment. The quince roots grow slowly and to preserve the balance between top and root systems it is necessary to practice severe pruning. At least one-half of the growth of the tops should be removed every year.

For general market purposes the standard form has usually been regarded as best, but in my own mind there is some doubt as to this point Dwarf trees have the advantage of coming into bearing sooner than standards, and some varieties—notably Angouleme —are much improved in quality by dwarfing. Some of the finest varieties, however, will not grow on the quince without "double working," *i. e.* first using some variety to which the quince stock is congenial, and then grafting the desired variety on this. Among the sorts requiring double working may be mentioned Bosc, Winter Nelis and Sheldon. Bartlett does better if double worked, but this variety is so precocious I should always grow it as a standard.

To obtain the delicious flavor and delicate aroma of the pear, the fruit should be picked just as soon as mature—before it is fully ripe—and should be placed in a cool, dark, moist place to ripen. This treatment will also prevent the formation of the hard gritty substance around the core, and will greatly lessen the tendency to rot at the core. It is the failure to observe these conditions which renders certain varieties unsatisfactory. (This is notably true of Clapp's Favorite and Boussock.)

As a rule at least one-half of the fruit which "sets" on any given tree may be removed while immature with profit to the orchardist and great advantage to the tree. The fruit remaining will often double in size, will be of better quality, and the drain upon the vitality of the tree will be greatly reduced.

The remarks already made concerning the use of small packages in marketing will apply with special force in handling pears.

As varieties suitable for general planting, I would suggest Clapp Favorite, Bartlett, Louise Bonne of Jersey, Sheldon, Angouleme, Anjou, Lawrence.

THE PLUM.

The plum is capricious, requiring soil, climate and environment all congenial that it may be profitable in its returns. For this reason it cannot be recommended for extensive planting unless the grower is willing to devote thought and attention to the needs of his fruit. Trusting to Providence and the hired man will inevitably result in failure. Under favorable conditions, however, the plum is a most satisfactory fruit to grow.

The best soil for plums is a strong, rich, clay loam. I say a rich soil, but an excess of nitrogenous matter is not desired. It may even be injurious in exciting rank, vigorous growth at the expense of fruit. For this reason stable manure should be used with care, if at all. Potash is the specific for plums, while a liberal quantity of phosphoric acid is also essential. Hard wood ashes make an excellent fertilizer for the plum orchard, and to these may be added a small amount of ground bone.

Thorough but shallow cultivation is advisable. The roots of the plum tree grow close to the surface and deep plowing is always injurious. On moderately light soil a spring-tooth harrow will be the only implement required.

The great drawback in plum culture is the ever present danger from black knot. This disease is a veritable cancer and cannot safely be trifled with. The only satisfactory remedy is "a good sharp knife and courage to use it;" though after removing a "knot" it is usually well to paint the wound with kerosene or turpentine. At least twice every year the orchard should be carefully examined and every trace of the disease removed.

In the selection of varieties, hardiness, productiveness and market demand are to be considered first of all, but in every collection should be a few of the choicer sorts for home consumption. Reine Claude de Bavay (Bavay's Green Gage), where sufficiently hardy is one of the most profitable plums grown and its quality is good enough for any collection. The tree, however, is short lived. Lombard, hardy, exceedingly productive and of fairly good quality, is justly popular and has aptly been called "everybody's plum." But the fact that it is so commonly grown detracts from its value for the specialist. Bradshaw is one of the very best. It is large, handsome, of good quality and will sell at sight, while the tree is hardy and productive. Every collection for home use should include the McLaughlin, and we should, perhaps, add to the list of market varieties the Moore's Arctic, because of its extreme hardiness. The quality of this sort is, however, decidedly inferior.

In the more favored portions of the country the introduction of the newer Japanese varieties promises to open a new era in plum culture. The large size, attractive appearance and firm texture of the fruit will render these sorts specially valuable for market purposes. The most promising varieties of this class at the present time are Burbank, Abundance and Willard.

In this hasty survey of a most important branch of rural work we have but looked over the fence and caught a glimpse of the practical work of orchard culture. We have not considered the comfort and satisfaction to be derived from an abundant supply of fruits for the home table; the pleasure of studying the problems of plant life; the interest centered in the development of leaf and flower and fruit, and various other considerations which some may be pleased to term "sentimental."

But the man who neglects the home and the study of the elevating phases of his occupation, bending his whole energies to sordid ends, does much to bring reproach upon his calling. Continual groveling in the soil, with no hope and no ambition beyond getting out of debt or adding to the bank account, has dwarfed the souls of men all over this broad land. One of the important features of orcharding is that the successful man must be alert, active, mentally and physically. He must love the business, and from the very nature of things he will be a better man for the exercise of his taste for nature and natural objects. Fruit growers, as a rule, are among the most successful and most respected of our citizens.

If every man has not the taste, the inclination or the facilities for successful commercial orcharding, there still is no reason why every farm should not have its collection of fruits just as certainly as its acres of hay and grain or its herds of sheep and swine.

The stage in Music Hall, Farmington, as it appeared during the Dairy Conference, December 4, 5 and 6, 1894

DAIRYING AND ITS DEFINITIONS.

An Address by JOHN GOULD of Ohio. Delivered at State Dairy Meeting at Farmington.

One of the most important questions we are called upon to solve is whether dairying does or does not pay; whether it is a profitable vocation or simply a make-shift to attain a possible living. If it does pay, can it be conducted on old lines, or shall the dairyman cut loose, so to speak, from old ways, and strike out into new channels of method and say, "I'll do better, try new ideas and be progressive in the future?"

Conducted as dairies may be, in the light of recent practical investigation, we may assume that no industry in this country, taking capital invested, and giving credit where credit is due, gives so large a return on actual capital invested, as does the farm dairy. That some farms and dairies pay their owners a living and dividends for labor, and other dairies do not pay, seem proof conclusive, that if the dairy does not pay, it is more the fault of the man "than of our stars, dear Brutus."

That farm values have shrunken is no fault of the cow, for all industrial stocks have shared like fate. In the past two years the railway stocks of this country have shown a shrinkage of hundreds of millions of dollars. High-grade dairy cows have fallen in value, but the farm yet produces full average, and even better crops; the cars are run, the cows are on the uphill of increased production, even if cheaper. More butter and cheese and milk were sold in 1893 than ever before and at full average prices. Grain is not higher, but more farmers than ever before raised their own "cow feed," and on the whole, the well-managed dairy paid, will pay this year, and the next.

Argue as we may about the conspiracy going on "to down" the farmer, this remains, and there will be even more produced in 1895 than ever before. That no set or class can conspire and prevent the farmer from having a well-kept and productive farm, owning a good dairy, and making fine dairy products, obtaining the top of the market prices, and besides, making a rich living so far as food and drink go, from the farm for which he pays not a cent, while his brother in the city, faring no better, yet buying all, pays out the largest share of his salary. All this is beyond law regulation and the extortions of the robber barons, and he who runs a dairy by the best plan and system he can devise or learn about, is laying a firm foundation for success independent of governmental enactments.

In looking back over the past and making note of the things we have seen and read of, we can think of scores of men who started out as dairy renters, obtained a start, then a farm was purchased and paid for, and the discomforts of the first years gave place to the actual comforts; the white farm-house and the red barn appeared, the children were educated, married off, and set up and set out, the poor were remembered, the Gospel was supported, the farm was stocked with machinery, and, strangest of all, hundreds of these men are money lenders in some degree.

I am sure that after thirty years' devoted to the business and seeing thousands of dollars of debt and interest gradually and finally become extinct, that the dairy business is as safe an occupation as any; but to make dairying a successful success, it should be made the chief industry of the farm, and occupy the studied attention of the owner. Do you hear of any considerable number of dairymen who have put knowledge, attention, zeal and judgment into their vocation and let outside speculation alone, and have failed and made assignments? Do you find that nine strictly dairy farmers fail to one village business man? Do you recall the instance of a first-class dairyman going under?

But the average dairyman has a world of information to gain before he can secure this best success. It seems easy to say, why are not all dairymen successful like those whose names are seen every day in print, and all be shining examples of shining success in dairying? Why, in answer, are not all political aspirants the equals of Blaine, Cleveland, McKinley, Mills, Sherman and Carlisle? I am free to say that it is natural ability, aptitude for business, actually making it a matter of dairy sentiment; call it love for the cow if you will, that has largely to do with the successful success in dairying.

Some men have always been in the front in dairying; and all these men, when their secrets of success have been fathomed, have been the men who are possessed of advanced ideas. They were the first to recognize a dairy cow, and refused to look for milk in all forms. They were the first to adopt new inventions; they were the men who read dairy literature and attended conventions. They are in the front all the time.

I know there is a reproachful old saying about "kissing a cow," but the dairyman who best succeeds must come very near it. He must watch her, anticipate her wants and demands and furnish her with all cow comforts. He must humor her to a great extent, and put himself in the position of all things to all cows to win the pail of milk, which, left to the care and opinion of another man to execute, would be a very small pail at least.

It is not all natural ability that succeeds after all. There are rules and regulations one may adopt and school himself into that will come very near bringing a man to the point as a successful dairyman. These rules, if followed by the average dairyman, would help him vastly. A man may naturally succeed in dairying, it being his inborn ability to handle cows; but I hold it absurd that a man who is not mentally and physically lazy cannot learn dairying to the point of attaining success. A man who will try to develop his powers of reasoning, and attempts persistently to broaden his judgment, will enlarge his mental capacity to the point of success. Many a man sent to Sing Sing has become a skilled artisan, who never dreamed he had skillful powers. Why on the farm, breathing the free air of Heaven, with a freeman's foot on the soil, with a fair promise of comfortable living and dollars as a reward, why be slothful, indifferent, and feel the everlasting pinch of want? Why this man should not be in the front rank of successful success passes all human understanding.

I know there is a wide-spread aversion to being tied to a cow, figuratively speaking; of working with a certain round of regularity that the dairy imposes. But why object to the pressure of steady, remunerative labor, that has its pay always in sight, and count instead, as thousands do, the steady, augmenting obligations from which death only releases?

Success in dairying can not be obtained by "trusting to luck," a "trust," defined by a bright westerner as a false light that had wrecked more men than all the corporate trusts since the foundation of the world. There is no luck in dairying. Success has always come and always will, by thoughtful, studious attention to the industry, and an attempt to provide the most and best at the smallest possible expense.

To this end the dairyman must take cognizance of the following leading ideas, not wholly new, but all to be more generally adopted:

1. A dairyman in love with his business and determined to stay by it and ever be progressive.

2. A dairy cow fitted for a special purpose.

3. A dividing up of the industry into three divisions; butter dairies, factory milk and city supplies; and

4. The adoption of the milk and cream test for each dairy, and pay a divide by the per cent. of solids in milk, and not by the weight of the water in which they float.

5. Abundant and suitable foods for this cow, home grown as nearly as possible, and not adapted to feeding of steers (whether male or female.)

6. Barns and stables made for dairies, and winter comfort, and not modeled after a summer garden pavilion, and these barns so arranged that economy can be practiced in every way.

7. Having a definite knowledge of what you want, what is required of you and above all, market judgment and tact to cater to and please that market.

These propositions you will see, are not new, nor very strange, and are possibly reiterations, but I am Methodist enough to understand that one class meeting does not greatly differ from another. Love feasts are duplicates; still, in the repetition of experiences, hopes and fears, and appeals for more faith, these good oft-repeated purposes and resolves become towers of strength.

To obtain successful results in the future we must find out whether we are being injured so much by competition as by our own failure to comprehend and push to its limit the productive quality of our dairies.

The man with a two hundred and seventy-five pound butter cow, or a six thousand pounds of milk factory cow, fed on the now demonstarted best and cheapest foods, is not finding hard competition. It's the man with the common cow, varying pasture feed and the well ventilated barn and hay ration for the winter, that is ground between the nether millstones of western produce and that of his more progressive neighbor. To say that the dairy does not pay is suggestive of a practice that smacks of tradition and prejudice. The successful dairyman can not be an obstructionist and say that the best instruction of to-day is not as valuable as common sense. The man who, years ago, learned all about dairying and discards all recent investigation is not now a safe adviser. This man, in his day, has objected to warm barns because they made cows tender, would not own well-bred cows, as they were easily susceptible to disease, pronounced against succulent winter food, as it was "agen nature," that cows kept in a stable continuously fifteen weeks would die for want of exercise, declared as nonsense the idea that all milk was not alike valuable for butter and cheese making, has issued his proclamation against granulated washed butter, because it would not keep, that the market won't buy sweet cream butter, that the extractor will never work, and finally Bro. Jasper was right, that "the sun he do move."

I would have this successful dairyman not only in love with his vocation, but a student who reads widely, thinks deeply; not a chronic pessimist, but one who has confidence in himself, faith in his cows; not a self-contained man, but one who sees, invents, copies and uses borrowed ideas, if good, as well. This man should have definite aims, does not shift his business each year, but selects one of the three great dairy industries and stays by it, and gains both reputation and money. This allows him to bend every energy to the one task, cheapen here and be more lavish there, and so guides, directs and molds.

This man's dairy is so ordered that it produces nearly or quite every day in the year, giving continuous income, and remuneration as well. Successful success implies continuous industry; not the kind a man once asserted that he liked, the kind of farming he could stick in the ground, and while it was growing go to town and play pitch.

The cow the dairyman must keep is a matter he must decide for himself from the standpoint of demand, butter, cheese or city milk. But in this I think we are all agreed, that whatever the breed, she must be of the dairy type as contrasted with the beef form. Gov. Hoard's cow I think has become the accepted model, and we can now see whether this cow be Jersey, Holstein, Guernsey or scrub. That peculiar conformation of "form to purpose," is now everywhere recognized and accepted as the cow that the dairyman wants.—(The dairy form.)

By general consent the dairyman has let go his hold upon the combination cow. I have heard more about the special dairy cows within the past year than in any ten that preceded it. The beefy, blocky cow of elephantine proportions is denounced as a dairy cow. The profits of carrying five hundred pounds of extra beef on a cow for six or eight years, to sell at last for a cent per pound, has lost its charm. Its excuse now is that it needs a big mother to raise a steer, a double office, a power to transmit beef qualities to the steer, and the dairy habit to the heifers; but is it not a fact that the steer is a result of after food and skill upon the part of the feeder? True it is, but few dairymen raise steers, though some farmers' milk dairies might as well be classed on the male side, so far as profit goes. The dairyman is fast finding out that the ration that makes the pound of steer beef, as readily makes the pound of butter, or the two pounds of full stock cheese. The dairyman can not longer afford to put the valuable ration into unknown and uncontrollable channels of production such as the combined cow must have with the double heredity back of her, struggling for the mastery of this ration. I admit that I have seen milk in copious measure drawn from the beef form, but my experiment with it is that the beef influence soon gains the mastery and my great blocky milker goes dry seven months of the year.

Let the milk flow be what it may, feed alone can not control the quality of the milk. The cow has an individuality of her own, a born milking habit, and the greater the number of her ancestral grand dames that have possessed this milking trait, the greater the probabilities that this cow will possess like qualities. Remember this, no man ever stimulated a cow into good performance that did not have this born quality of development to start with; but thousands of heifers that were born to make the best of cows, have been utterly ruined by bad feeding, cruel treatment, and needless neglect Success in dairying implies that a dairyman should raise his own cows, as far as he can, and buy if he must, wisely. So he must be a judge of cows, a collector of dairy form and preferences and a reader of cow character, a cow phrenologist, like Brother Hoard, for example.

Better cow feeding and handling of cows, to the average dairyman, would carry with it greater success. All this talk about making cows hardy, tough, and constitutionally vigorous beyond what we feed into them by wise selection, should be eliminated as quickly as possible from our dairy wisdom.

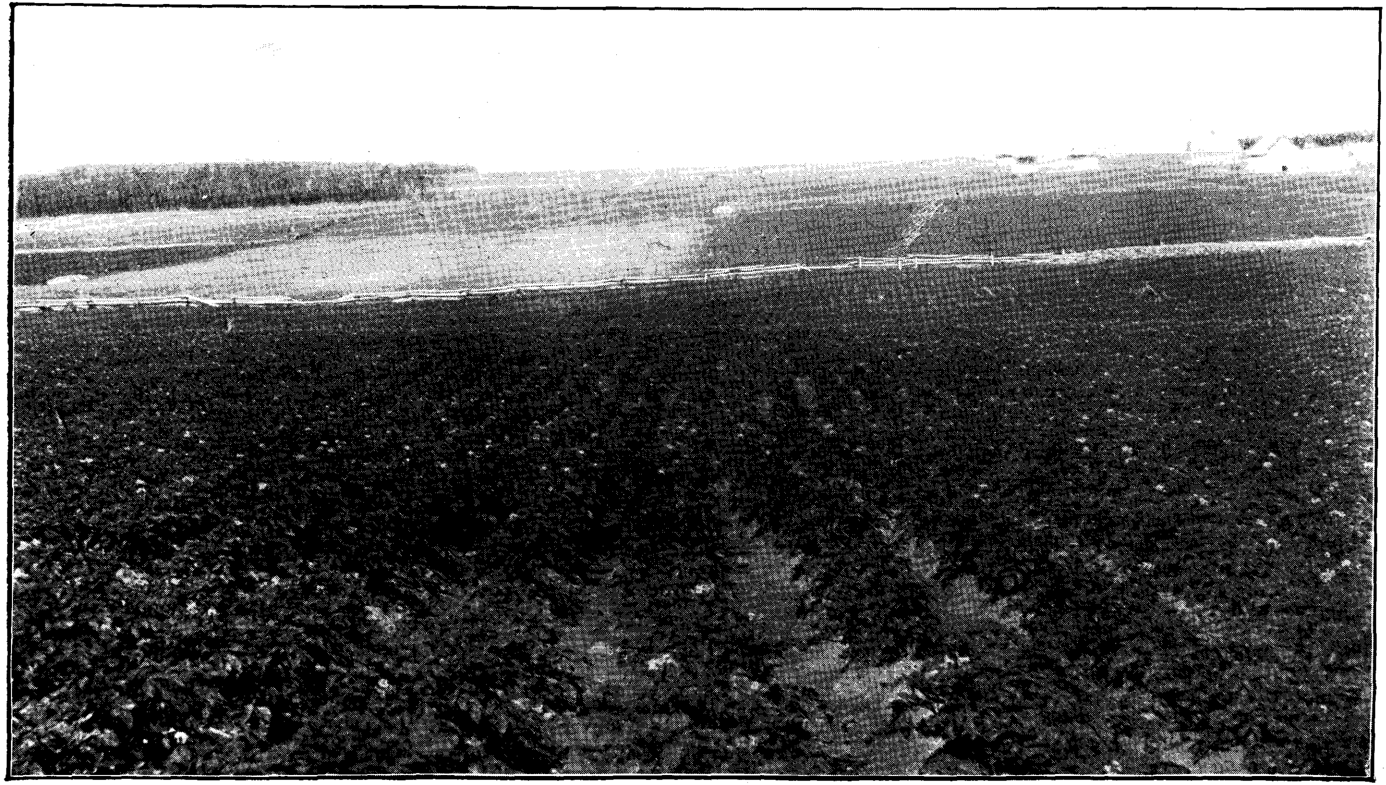
At best our cows are boarders, and profit means that for part of the year, the longer period the better, they shall pay us rates so high that we can in midsummer give them free entertainment for a few weeks. I do not plead for more fussing and pottering with this cow, but a little more rational care, and we should sooner begin the extra care of the milker. The plan of the winter dairy is showing farmers that profitable cost of this cow means more than a wide range of summer pasture, and beginning to stable her Thanksgiving night. A really kind-hearted man may without thought, actually abuse a cow by neglect I have seen this last autumn, a dairy of fast freshening winter milkers stand for hours, yes, days in the aggregate, in the chilly, drenching rain, rounding their backs as the deluge of water broke across their spines, and go into camp at night in the muddy fence corners of a long, unprotected lane, and these cattle were contributing as best they could to their owner's living. I don't think he ever thought of the milking habit of these cows, as a maternal function, artificially prolonged. The intended food for offspring turned by the hand of man into the channel of commerce, and so denied them after offices of a mother. No other benevolence of nature would thus have contributed to him, save this unfatherable beneficence of motherhood whose office is forever to give, even if draining the fountains of life-support itself. Success must come nearest to those who recognize to the fullest extent this underlying principal of attaining succees in dairying. Whatever will best administer to the comforts of the mother cow, quiet, care, warmth, comfort, succulent and stimulating food, pure air, clean water, and regularity of attention will succeed, for on this hang the law and the profits, so far as concerns the cow.

The dairy world laughed when the late Hiram Smith said that the chewing of the cud was all the exercise a milch cow needed in the winter, but now it thinks differently. The point is like this: Milk making is an expenditure of nerve energy. The cow making one pound of butter a day puts not far from four and one-half pounds of solids into that milk, which otherwise would represent energy, and if not expended in this way, would need an outlet in exercise. The embryo calf calls for less than a third of a pound of solid matter per day. This cow if properly housed in a comfortable stall, not made rigid in a stanchion, but haltered, given a full amount of sunlight and pure air, will not suffer for fifteen weeks if kept in a stable and then when summer comes, get her exercise in pastures green, and along sparkling brooks, ready to take her place again in the dairy in the fall.

Successful success will come sooner if the dairymen will take the inves igators at their word and stop trying to feed excellence and quality into a cow's milk above her natural, normal limit of production. We may accept Gov. Hoard's other dictum that the quality of milk a cow is to give is born with her, and no feeding will make a Holstein of old type, give Jersey milk, or starve a Jersey into giving Holstein milk. We may feed the cow and increase the quantity, feed her up to the limiit of normal limit, and here we stop. Beyond this this cow can not go, and beyond this, food is lost in vain attempt to attain what nature has prohibited. In some way nature established a sort of fixed relation between the solids in a cow's milk, and these remain fairly constant; and so while we may feed quantity to a certain extent into a cow's milk, the quality is beyond our power to regulate, so our success will soonest come to select the rich, deep milkers, and give them the food, rather than to feed poor cows to get greater yields of the same sort of milk which they must, and can only give.

Then comes the rations for our cows, abundant and cheap, and of some variety will have largely to do with obtaining success. The everlasting pasture, the unending diet of dry hay, and some corn in the ear, will not do in the future. This food of support and food of production must be studied and saved. The cow first lives out of the rations and makes milk of the unexpended balance, though some cows are less miserly than others. This habit of economy in living and beneficence in giving may become inherent in a breed, but as a rule the cow is like the Arkansas jury, "Do you find for plaintiff or defendant?" asked the judge of the jury. Rolling his tobacco quid over where he could get a fresh grip on it, the foreman replied: "What is this jury fer? We found fer ourselves first, jedge." We must know more about these rations, and scoff at science a great deal less, for investigation is, after all, only seeking after facts, and the Ohio State university has the skill, and the apparatus, and the money to find this out. All admit that milk is recomposed food, changed in some way, and believe that the fats in milk are not the result of oil fed to cows, else we would all be feeding cheap grease and getting fancy butter. What shall we feed, how much, how often, and when and where, and all connected with this subject?

I am stronger in the belief than ever that silage made from green corn and clover, is to be the great roughage ration of the future. What we should feed with it is the question with me. If I can raise fifteen to twenty tons of excellent silage upon an acre, and



POTATO FIELD OF GEO. W. BENNETT, LIMESTONE, AROOSTOOK COUNTY, ME.

raise and sell it for eighty cents per ton with an actual outlay of less than sixty cents in money, and six tons will keep a cow one hundred and ninety-five days, that part of the question is solved for me. But I had to raise oats to balance that ration, buy shorts and feed clover, etc. Nine acres, last winter, furnished ample roughage for my twenty head of stock, and last summer sixty acres of pasture did no better.

Full success in dairying will and can only come to the general dairyman and restore him to an individuality he has lost in the present system of associated dairying when there is a general adoption of the milk testing plan at our factories in place of the pooling method by weight. The allotting to each patron the value of the cheese and fat value of his milk, putting each dairy upon its own base of performance, must be made conspicuous in our dairying. The man who sells milk or cream or puts it into a common reservoir, should receive for it in the end an equivalent that its contents of fat and cheese entitle him to. There is no more commercial sense in pooling milk at the factory by our plan of division than that all horses should be sold for ten cents per pound, irrespective of merit or performance.

The moment we introduce the test plan we bring in an educational feature, a study along the lines of milk production that will open up new features, and propose new plans that will make success all the more certain. The first awakening will be of obtaining milk of better quality, and the poor cow will quickly go, for the dairyman will find out quickly that it is not the feed that makes the quality, but rather the born development of the cow; and as a result, better cows will be selected, the food consumed will be better proportioned, and when consumed will be better assimilated; less cows will be needed, and a consequent economy and yet an increase secured that will win success.

If the State is constitutionally committed to support agricultural schools, why should not the State agricultural colleges have branch dairy schools at convenient points, fully equipped, and after a certain date make it a matter of compulsion, by State law, that the man who stands beside a factory vat, or a power churn, shall have his diploma from this school, as much as the girl who teaches the district school shall possess a certificate of examination? This would work no injustice to the already skillful and well-informed maker, but would shut off the employment of thousands of "cheap

Johns" whose only qualification is that they last year drove a milk wagon. This school should be easy of access, the tuition should be free, and every plan feasible with thoroughness should be adopted. Denmark is dotted all over with these government dairy schools; Sweden has them, and even Finland. Maine should have one of these schools at the State university, and besides, some competent man should be furnished a portable churn and cream-can, and given an itinerant commission to go teach butter-making from Eastport to the uttermost corners of the State.

ELDER J. B. VANCE of Alfred being called out said,

Ladies and Gentlemen: The pleasantest thing I shall say to you is that I am to occupy but three minutes. I think it was Artemus Ward who when he was asked to lecture wanted a scientific subject chosen for him because he knew nothing about it, and so would not be limited in talking. I know just enough about dairying to be decidedly limited. Perhaps I would better use the three minutes by asking you, each one of you, to ask himself the question: Of what benefit are these meetings here in Farmington? What good is it going to do men to come fifty or sixty miles and spend a couple of days? It depends entirely upon the use we make of coming here. How many ideas do I carry home? How much have I to tell our people that will be beneficial to them?

I remember this year, for the first time I got a bulletin from the board of agriculture. Our friend McKeen was a real Yankee, he was great for asking questions, and the very best questions for me that he asked were the ones that I could not answer. If there are some things that have been stated here that you and I at first say "I do not believe," perhaps these are the very statements that we need, the things that we are inclined to refuse. All through history you know it has been what should have been the chief stone of the corner has been laid aside, and we make it so in our lives. We have waked up in Alfred and the adjoining towns in the last two or three years to the necessity of knowing something more, and the first thing we had to find out was what we did not know. Now, my friends, if we have come here thinking that we know all that we need to know I will guarantee these meetings will not pay us. If there is any one who thinks he knew it all before, it was not for him that the meeting was called. I am quite satisfied there were a good many things I did not know, and there are a great many things I do not know yet. I propose to carry home with me the facts I have heard here; and if there are some that I am not quite willing to accept I will investigate them, and experiment and decide whether Mr. Gould is a humbug or whether he is a very good teacher. That he is a very good speaker we all know. In regard to the housing of the cows and some such points I have heard friend Gould describe what used to be a great many years ago. If he had come here long before I was born he would have found some such things, but we do not use our cows that way now.

Let me say that friend McKeen wanted that you should be let down easy. Friend Gould had got you away up in the air. I think I have let you down and I will step down.

Mr. Gould was now called upon to answer a few questions.

Ques. What are the best methods to be used in the care of the milk from the time it is drawn from the cow until the cream is separated from the milk, in order to get the best results in flavors and consequently in high prices?

Ans. *Cleanliness and cold;* everlastingly keeping at both of them. I want to say that the man who comes nearest to making fancy butter has come nearest to getting clean butter without anything in it but butter. If you have got anything else in it you are selling something for thirty-five cents a pound that does not belong in it. I think perhaps that covers the whole ground. It is cleanly keeping of the cows, cleanly milking, cleanly care of the milk, keeping the ferments that we do not need, out, by a certain temperature; and the nearest we can keep milk at forty-five degrees the longer we can keep it. Do not keep it down to thirty-two degrees because you get bitter milk after a while; and keep everything in the name of preservalines and preservatives out of it. There is nothing that will keep milk so long as coldness and cleanliness. When we buy milk we do not want to buy chemicals,—we send for a doctor and have him give us the chemicals in the right proportions.

Ques. To keep everything clean we must have our barns well ventilated. Now will you tell us the best method of ventilation?

Ans. The plan that we have adopted in our barn I think comes the nearest to perfect ventilation. The average barn is usually ventilated at the top, but that lets out all the warm air, and the thing that you want to let out is right down on the floor and you do not get at that. Now instead of having your shoots for ventilation stop at the ceiling let them come done to within a foot of the floor. Commence the shoot on the outside and let it go up between the lining boards and the studding and the cold air is distributed with the warm air and takes out the gases and the foul smells. They go out because the draft comes down so close to the floor that it takes them out, and leaves the warm air that you want. Do not make a hole right through at the top of the stable. You must have that draft come nearly to the stable floor, and then shut up your stable as tightly as you can. You never saw a room that was shut up so closely but what a stove would draw perfectly; and you will not be troubled with smothering your cows. I would have two of these shafts on a stable fifty or sixty feet long, and I think you will get as perfect ventilation as you can possibly get.

Ques. Would you have the ventilators in the front of the stable or in the rear?

Ans. At the side walls behind the cows.

Ques. Will Mr. Gould speak to us for a few moments upon the value of light and sunshine in the cow stable.

Mr. Gould—We ourselves like a light room to live in, and I do not know that animal life is any different from human life so far as its sanitary needs are concerned. We know that if we have a stable that has sunlight in abundance we as a rule have a dry stable, and one in which the sunlight is killing the injurious germs that get into the milk. In order to have my stable light I have a window for each two and one-half cows on both sides, and that makes it as light as this room. If you can, have your stable run to the south.

I am a great believer in an L to a barn for a cow stable, made for nothing else but a cow stable; and then the breath of the cows and all these things are not contaminating the hay. Damp hay picks up germs, the germs live on it and it soon gets to be mouldy hay; but we say "The cows will eat it all right." I do not want the food my cows eat in the place where they stay. The barn should be built with an L, with the light coming in in the forenoon from the east and in the afternoon from the west. We used to have a basement barn, and it was dark when the doors were shut up, and was always damp, and the cows would be chilly; but with these barns we get rid of those things and get a warm barn.

Ques. Will the barn of the future have a cellar under it?

Ans. I stand between the deep sea and something else that begins with D now. The Maine farmer says a cellar under the barn is essential to his comfort and well-being in handling manure and all these things; but I want to say that the dairyman in twenty-five years from now who has a cellar under his cow barn, cannot sell his cream to any creamery in Maine.

I want to say one word more; and that is, that Maine does not appreciate the corn plant as a big roughage ration for its dairy cows, as it should. The dairy cow of the future will eat five pounds of corn fodder in some form to every pound of other fodder that she eats. It is the ration that the dairy cow of the future will have, and the man that does not give her that ration is going to get left in the cost of production, and I say to you to-day commence on that as a basis. In the cold winter months you are going to depend on that corn plant more and more every year as a ration for your cows.

Ques Does Mr Gould believe in the silo?

Ans. I have talked silo for the last nine years in twenty-six states in this Union, and since I have got down here to Maine I have talked it so much that I begin to half believe in the system myself. I want to say this, that the moment my silo cannot be brought into my dairying I shall quit dairying. I shall quit dairying when I cannot avail myself of the silo as a great method of providing cheap, succulent food, and making 365 days of summer in a year on my farm.

Ques. About the use of ensilage in the summer time?

Ans. A few of us have commenced to put up more ensilage than we need for the winter so that we shall have twenty-five or thirty tons to use after our summer grass has begun to wane and we need more rations, and every man who has tried this plan is the warmest admirer of it in the world, because we pretty nearly escape buying grain in the summer; and all we need is to have a little more forage and when we get through feeding in the spring put two or three inches of very wet straw on the ensilage and a few boards to keep out the air, and when we take off the boards the last of July or the first of August we shall not see that it has changed a particle. In changing from ensilage to the best corn fodder, corn and all, the cows drop right off in spite of all we can do. Everything goes into the silo with us, the ears as well as the stalks.

Ques. Did you give your cows as much of the green corn as of the ensilage?

Ans. We gave them all they would eat, and we only gave about forty pounds of the ensilage.

Ques. How can you account for the fact?

Ans. The explanation is simply this,—our food in the silo is partially digested, and it does not cost as much animal power to digest it, and the cows naturally get more out of it than out of the green corn stalk. That was the explanation we got back from our Experiment Station.

Ques. Do I understand you to say that the green corn, ears and all, fed right from the field did not produce so good a result as that that had laid over a year in the silo?

Ans. That is exactly the case. That is the experience of every man who has tried it. I suppose the cows eat a little more of the ensilage and it is in a better condition for the stomach than the corn right from the field. I suppose if we get right down to the truth of it they eat more of the ensilage and get more food nutrients out of it.

Ques. What ration of grain would you feed with meadow hay? Is cotton seed meal and meadow hay all right for a dairy feed? Question referred to Prof. Jordan.

Prof JORDAN. I should prefer something else.

Ques. What else?

Ans. A little of your ensilage.

Ques. Is that enough?

Ans. English hay, ensilage and cotton seed meal will produce a good quantity of milk.

Ques. What is the relative value of cotton seed meal and corn meal?

Mr. GOULD. Cotton seed meal contains nearly three times as much nitrogen, and the thing that you are feeding grain for is to get nitrogen.

Prof. JORDAN—I am not quite satisfied with the question of the green corn as compared with ensilage. I am willing to take your last statement as settling it, that the cows eat more dry matter in the ensilage than in the green corn; but if you put the digestible part into it then we shall have to take off our coats and get up on the platform and have it out.

Mr. GOULD—The fact exists that the change was the cause of a loss of milk, and I tried to explain it on both of those grounds.

Ques. About barley late in the season for a fall feed?

Ans. All our barley goes to the breweries and it is a very small crop. A few of us have got to sowing some barley as soon as the oats are cut, and it is a magnificent feed for the cattle in the fall. I do not know of any way in which you can get more soil matter for the next crop. I think it is a big thing to do to sow barley as a catch crop, and get the top in feed value, and the roots to go back for manure.

Ques. I would like to ask Mr. Oakes, a gentleman from our town who sowed some barley last fall, how he was satisfied with it.

Mr. Oakes—I sowed it about the thirteenth of August, which I think was too late. It was a small piece and merely on trial, but I liked it very much.

Mr. Gould—As this will be my last opportunity to speak to an audience in Maine I want to take this occasion to return my sincere thanks for the cordiality and friendship with which I have been welcomed everywhere. I shall go away thinking more of Maine than ever before, and if my coming here has been of any benefit to you, if any man will be a better farmer, a better dairyman, or shall think more of his business, then my coming here shall have been amply rewarded.

An object lesson in separating cream from milk, and making and working butter was given to the audience, the machinery used for this purpose being that which is in constant use upon the farm of Mr. Weeks of Vassalboro.

As soon as the noise of the machinery had subsided sufficiently the following explanations were made by Mr. John Gould.

Mr. Gould—You remember when you were boys and used to turn the grindstone for grandfather, that when you were turning it pretty fast the water would fly off. When you turned it slowly the attraction of gravitation would hold the water upon the stone, but when you turned faster so that the centrifugal force was stronger than the force of gravity the water would begin to fly off and grandfather would say "Hold on, you are getting me all wet."

Now somebody discovered that milk was composed of more than one substance. Somebody discovered that butter fat came up on top of the milk because it was lighter than anything else in the milk. It took us a great many generations to find that out, but when we found it out, we began to discover different ways of setting the milk, such as putting in ice, in order to get our cream up to the top more quickly. Now somebody says "If we can use cold to hasten the rising of cream, why should not we use pure force in some way so that we shall throw this butter fat to the centre and the heavier parts to the sides of a vessel." The first cream separator that I ever saw was a kettle with a cover fastened to it with an arm. It had about 400 pounds of milk in it, and as the shaft began to revolve faster and faster our kettle began to stand out and rise up and rise up until at last it was standing out on the end of the arm of that machine. The principle is the same as if you were throwing a pail of water over your head. (I tried it once and the bail broke; the attraction of gravitation and the centrifugal force just balanced each other and I got the result.) All the substances in the milk were heavier than the cream, and we whirled that 400 pounds of milk a certain number of minutes at a certain velocity and the cream was forced to come to the surface—that is, to the inside surface. You say "How am I going to get the cream out?" When the machine was stopped the bucket gradually came down right side up and the cream was on top.

Now from this somebody thought why not have a cylinder revolving very fast, with a stream of milk pouring into it; then as the milk is being whirled rapidly why will not the cream come to the inside of this cylinder? Now how are you going to skim it? That is the great trouble. Now somebody discovered too, that with a little tube put down in the inside running against this little wall of cream, and another little tube with a hook against the wall of milk on the back side, one would take out the cream and the other would take out the skimmed milk, and we could have a continuous flow of milk, into the separator and out of it. That is the general principle. There have been modifications but all working on one principle, to have the centrifugal force throw the milk to the outside walls, and the cream to the inside.

This machine is perhaps the most perfect of any. The first machine was cumbersome and cost hundreds of dollars. So it was considered to be not for the farmer, not for the dairyman, but for the man of fashion. And then the thing stopped until somebody said "Why not make a smaller machine, and introduce the grindstone principle,—have somebody turn the crank,—and introduce this into the dairy?" And so we have separators that throw out two or three hundred pounds of milk an hour and do it perfectly. Now comes the question, why use these machines? There is an

FARM BUILDINGS OF JOS. E. SPEAR, LIMESTONE, AROOSTOOK COUNTY, ME.

individuality about the milk of different cows,—a long period of lactation makes it more difficult for the milk to give up its cream; and these things the force of gravity will not overcome, because gravity is only in proportion to the weight of the article. But the moment we come to put centrifugal force in the place of gravity we can put on any amount of force, and the gravity of one unit becomes four or five or six in centrifugal force. And we have got a machine that does not know any kind of feed or breed of cows; it simply puts so much force on to this revolving cylinder that the cream must come to the surface.

Can you think of anything that is costlier food to feed a pig than twenty-five cent butter, when a pound of oil meal will put more flesh on him than a pound of butter? By using this machine we get a practically perfect separation of the milk every day in the year. But we have got to be skillful and know something about our business. We must know that when cows have been in milk for six or eight months we must have a higher rate of speed; and we must know too, that the milk must have a certain temperature. We want to separate the milk at a little higher temperature in the winter than in the summer.

We also want to increase the rate of speed. If the rate is 5,000 revolutions, which means five miles a minute, in June, we must add another mile a minute later, in the fall. We want to raise the temperature to eighty-four degrees in the winter and add a thousand revolutions a minute, and then our milk will be creamed just alike at all times, or with only a slight variation, instead of varying as the samples yesterday, all the way from one-half pound to one-fourth pounds. That means just the difference between profit and loss when it comes to the details of fine dairying. There are a great many kinds of separators, the United States, Sharpless, Danish Western, International and a dozen others; but they are all variations of the same principle.

There is one point in regard to churning that I want to mention. Mr. Harris was telling us about texture in butter; what is that? It seems to me it is whether we can pull it out and make a stick of wax, or whether it will break off short. The cow has nothing to do with that; it is the man that stands at the churn. A great many say to me "I wish I could make butter that was not waxy."

Well, if you will stop when the butter comes, then you need not make it waxy. If I were churning, just before the cream began to break so that I could see the buttermilk I should put some brine right into it, and in this way we should break the butter up almost perfectly into fine granules; and when the buttermilk is nicely developed the butter is come. A pail of cold water should be put right into the butter, buttermilk and all, when it comes. We work over butter to get the buttermilk out. If we do not get it out in any other way we have to work it out by hand. But we try to get it out without any working at all, and so we put in a great deal of water. If we do not put water in, the butter is anywhere in the buttermilk, but if we add water to it we can hardly get the pail set down before the butter is up on top. That is so much gained without labor. Now we draw this out and put in another pail of water, not working it and getting it into lumps. It is not the butter which spoils, but the substances which are in the butter;—the butter never gets putrid, but the buttermilk in it. When we get the buttermilk out and substitute brine, our butter will keep.

The butter worker is as unnecessary as the spinning wheel in the house, and the butter paddle has no place in the dairy. (A paddle may have a place somewhere else in the house, but not in the dairy.) In place of the paddle I would use a little wooden four-tined fork. After the water or brine is drawn off, leaving the butter in the bottom of the churn, let us take this little fork and loosen it. Never work down on butter but work under and up. The ladies can generally tell by the size of a churning how many pounds there are in it, and we want as many ounces of salt as there are pounds of butter Scatter a little salt over the butter, and then take this little fork and work it up from the bottom; then scatter on some more salt and put the cover on and begin to work the butter into lumps in the churn. When it is worked into lumps take the fork and prick up the lumps again, as there will be water in the centre which you want to get rid of. Break it up and roll into lumps again slightly, and then the butter is worked over. A butter worker is absurd, and of no more use than a tin pan, and the butter bowl is also unnecessary. A great many women have butter bowls; but Mr. Harris, who comes into the State and tells us he can taste anything; says privately that he can taste the butter bowl; and this is one of the things that we can remedy by doing away with the butter worker. Let us print and pack right out of the churn. We have saved a great deal of work and have pure butter. I think the man and the woman who eat such butter will rise up and call the person who makes that butter blessed.

Ques. You were speaking about the scientific knowledge necessary in separating. I would ask if a higher temperature and higher speed are objectionable at any time of the year.

Ans. No, ordinarily not in any way objectionable. It is better to err on the side of too much heat than too little. Never separate any colder than seventy-five degrees; eighty is better, and the warm milk right from the cow is not much below ninety degrees.

The average man says "If I get a separator I want something to turn it with; I do not want to be a crank working another crank," and his wife always agrees with him on that point. The little hot air engines are very cheap and excellent for doing light work,—but we have here a little engine (referring to the little bull in the tread power) that can put a good deal of his nervous energy into separating milk, turning a churn and such things, rather than chasing his master around the pasture; and the little fellow that works in that tread power two hours a day will stay in the lot quiet. But I tell you what I would do.—I would not do as Mr. Weeks does, after he has done a nice job of work give him cold water; I would give him buttermilk or sweet milk. I thought I was getting at the source of potential energy until Mr. Weeks said he always gave him water.

MR. WEEKS.

Ladies and Gentlemen:—The chairman wished me to tell you about what I am doing with the separator and the tread power on my farm. My place is in Vassalboro, adjoining Augusta, and I am making a business of selling sweet cream in Augusta. I keep some twenty cows, sometimes more and sometimes less, as I change my cows to improve my herd, and I also buy the milk of some ten or a dozen cows more during the summer, and of a part of them the year around. I separate my milk with a No 2 Baby Separator, like the one here only a size smaller. I have run the separator four years and I can say to you that I am perfectly satisfied with it. It does just exactly as good work to-day as it did when I bought it, and I never have been obliged to lay out anything on it for repairs. I broke one of the wheels and sent for another but as there was a slight flaw in the casting they sent me one without charge. The tread power I have used since last spring; before that I turned the separator by hand, but last spring I had a large amount of milk and I saw that a tread power would be something that would fill my purpose better than an engine, because it could be managed by my boy, who is eleven years old now. He takes the milk, when we get a can full, and strains it into the separator and arranges the pulley; then leads out the little bull and puts him in and starts the separator. Then he goes after more milk, and while that is running through he takes the milk which is already separated and carries it to the calves.

One of the greatest advantages I find in the separator is that the skimmed milk is in the best possible condition to feed, and the calves thrive on it better than on milk that has to be warmed and may be sour.

Ques. About what temperature is your milk when it is run through?

Ans. We separate it as soon as possible after it comes from the cow; somewhere from eighty-five to ninety. If for any reason the milk which I buy is not brought in the morning when it should be, we warm it up to about eighty five degrees, but I find no trouble in running the milk through that my customers bring, as they bring it in cans and it is plenty warm, even in cold weather. I have a Babcock test, and occasionally I test the milk but hardly ever find more than a trace of butter fat after it has been run through the separator.

Ques. What is the cost of the tread power?

Ans. The tread power costs $75.

Ques. What is the cost of the separator?

Ans. The No. 2 costs $125; this one I believe is $200,—this is a No. 3. The No. 2 runs through 300 pounds of milk in an hour, and I believe that for all farm dairies it is a good, practical machine. If one is going to have four or five hundred pounds of milk night and morning he had better have a large one. But he would have to have a large number of cows in order to get this amount of milk.

Ques. Taking the cost of the tread power and the cost of the separator and the amount of work that you do, in how long a time will this machine pay for itself, in comparison with any former method that you have ever used?

Ans. If I had got to do the work myself, in comparison with the old pan system which I commenced with I should think it would pay me in less than a year. Comparing it with the Cooley system, for instance, which I run for two or three years;—with the separator you get a thorough separation any time during the year, trusting it to a boy who is capable of running it, or a hired man, and there is very small chance for them to make any waste. They have no chance of running off cream with the skimmed milk as would be possible with the Cooley system. You save an expense in ice, as you need have no ice at all with a separator. If you have good water that is all you need for making butter; you will need no ice unless for marketing butter at long distances in hot weather. Then you gain a point in the warmed skimmed milk for your calves. If a person is raising his own cows, which I believe is the way for us dairymen to do, he gains a long point there in my estimation, because the calves do finely on it, and you never have any trouble with them. I never have figured out the exact time in which the machine will pay for itself; it is a matter of guess work.

Ques. I desired to know as nearly as I could what your judgment in the matter is. If I lay out all this money in about how long a time may I fairly expect to save that money, in contradistinction to any of the old methods? Will I get it back in one year or two years on the basis of thirty cows?

Ans. I doubt if you would gain the extra amount expended in one year, but it seems to me that you ought to gain it in two years The cost of putting up ice and taking care of it through the summer is considerable Taking all these things into account I think you would surely gain it in two years.

Mr. Parker.—I will guarantee that he would save the extra expense in one year.

Another Gentleman.—We bought a separator and paid $225 for it. We had had the Cooley system for six or eight years, and from the best data that I could get I decided that we saved enough with the separator to pay for the machine in two years.

Ques. Is there any point gained by raising cream at a high temperature rather than a low one, in the keeping qualities of the butter?

Ans. I have had very little experience along that line. I have manufactured some butter from my surplus cream and it has been of a good quality,—better than the butter that I used to make. Perhaps part of the credit belongs to the machine and part to me.

In regard to the pan setting and the Cooley system, or the shallow setting and the deep setting which requires forty degrees of temperature, my experience is that the butter keeps much better from the shallow setting than from the deep setting; but I attribute this to the condition of the cream being nearer that of the butter after it is made.

A gentleman wishes me to mention another point.

We have all of us learned, some of us by painful experience, that foreign matter left in the cream will taint the butter. I was quite surprised soon after I got my separator, notwithstanding we tried to be pretty neat in our milking, and notwithstanding that we strained our milk through a common and a cloth strainer, I was quite surprised to see how much objectionable matter there was on the outer surface of the inside of the bowl. The centrifugal force throws all this foreign matter away from the cream, and consequently it does not stay in the cream long enough to affect it.

Mr. Weeks.—In buying milk I buy from three different parties and the girl who washes my separator said to me one day, "There is some trouble somewhere; some of the cows are giving bloody milk." (You will find it on the inside of the bowl, on the walls of it.) We watched our cows and knew they were all right, and I told the neighbors that some of their cows were wrong. They said they were all right, but I told them to find out. We made up our minds that it was one particular man, although he said that his cows were all right. I told the girl to separate the milk separately, and then we had him.

Question by Prof. Jordan. I am asked a great many times and I cannot give a satisfactory answer, which actually costs the most in labor, to raise the cream by the centrifugal process or by the other methods. What is your experience?

Ans. I would rather raise the cream and take care of it with the separator than the deep can setting. I am very sure the labor, taking it from the new milk to the cream for the churn, is less.

Ques. How can you explain it?

Ans. In getting cream from the separator I simply take new milk right from the cow and run the separator long enough to run the milk through, which is 300 pounds an hour with a No. 2 separator, and then your cream is all ready for ripening. That is all there is to it, except to wash the separator. In cool weather I wash it once a day; in warm weather, twice a day. With the Cooley system or deep can system, the milk must be strained into your cans, the cans put into your tank of ice water, your tank filled up, and the milk kept there twenty-four hours. Then the cans must be skimmed and your milk warmed for feeding the calves, and your cream warmed up to get it to the ripening process; and your tank has got to be washed to see that it does not become foul from the water standing, or milk spilled into it and becoming sour.

Ques. Is it necessary that a man who is making butter and using a separator, if he has a well or spring of fifty degrees temperature, should have ice in connection with his butter making?

Ans. I should say no. You need no ice to take care of the cream. I have to use ice because I market my cream sweet to customers.

Ques. Which requires the most dish-washing, washing the cans or the dishes used in separating?

Ans. Perhaps it would take a little longer to wash the separator. It takes from ten to fifteen minutes to wash everything in good shape.

Ques. Is it not a fact that after the milk is run through the separator if you turn in a pail of water and turn it with the same force, it will make the washing much easier?

Ans. In that way the machine is about half washed.

Mr. WEEKS.—There is a point which we sometimes overlook; in the deep can system you draw your milk from the bottom of your can and the cream falls down on the sides of your cans. If you are tending it yourself you turn in some milk and rinse it around and turn it in with your cream; if your hired man is looking after it and is in a hurry, he thinks it is well enough and away it goes! Or if you get your faucet turned too low, one-quarter of an inch of the cream has gone to the pigs or calves. Now in the separator your new milk is turned into the bowl, and all the chance there is for any waste, if you turn hot water through your bowl, is on the cream can, because the hot water carries all the cream down the bowl. I think that is quite a point, especially with a large number of cows.

Again in turning the separator by hand, I find that it turns easier when the necessary speed is kept up, forty-five revolutions per minute. So that if you are trusting your hired man or girl to run it, they are pretty sure to keep it up as high as is necessary, and are more likely to run it up to forty-eight or fifty which does not do any harm, than to let it get down to thirty-five when it will turn much harder.

Ques. You have based your estimates on thirty cows. We are constantly asked if in a dairy of ten cows the machine would be profitable?

Ans. If I had a dairy of from six to ten cows and had a good Cooley creamer I do not know as I would throw it away and buy a separator; but if I were going to fit up for ten cows I should fit up with a separator every time. The washing of the separator is the same for ten or thirty cows; it would simply be a matter of time in separating.

Ques. If you were fitting up for ten, twenty or thirty cows, would you build an ice house, if you had a separator?

Ans. I should have ice on a farm if I could get it anywhere near, for the convenience of the thing; but I do not think you would need it with a separator unless you wanted it in the butter making. You want ice to market butter in hot weather, but with a good well I think there is no need of ice in the manufacture of butter.

Ques. Suppose you take the cream out of the well at fifty degrees in a good hot morning, how long could you keep it below sixty degrees? In other words, if the temperature of the cream in the churn goes up to seventy-five or so, what would you do?

Ans. I think one would be very seldom troubled in that way.

Ques. Have you ever made any estimate of the cost of the labor required with a dairy of twenty cows?

Ans. I have in some discussions that we have had, but I could not give you the statements now; I have forgotten them. Perhaps some other gentleman can answer the question.

A sample taken from the separator was now exhibited by Mr. Gould, showing the foreign matter thrown out of the cream.

Mr. Gould—This is full of animal tissue, fertilizer and a great many other things which only the microscope and the chemist can discover. This will go into the butter in spite of any process known, except the centrifugal process. With the separator we have this to use on the farm and beat the "Bowker's" by just so much.

NOTES ON MILK.

By HENRY E. ALVORD, of Spring Hill Farm, Fairfax County, Virginia.

Nearly every one attending a public agricultural meeting in New England may be assumed to be interested in milk production or in the handling of milk and its products. Therefore, although milk is a well-worn topic for such an occasion, it may be allowable to repeat some facts familiar to dairy meetings. My object is to renew an interest in the study of milk on the part of those who produce it, or handle it, or use it, so as to cause them to pay closer attention to every part of the subject or business.

The first inquiry may properly be as to the formation and composition of milk and the nature and peculiarities of its different parts.

To the naked eye milk appears to be a whitish, opaque fluid, of a perfectly homogeneous nature (as first drawn from the cow) but upon being examined with a microscope, its true phys'cal character is revealed. Milk is thus shown to consist of a thin, watery fluid, in which are suspended myriads of minute globules, round or ovoid in form and differing in size. These globu!es are minute particles of fat and to their presence is due the butter value of milk. Different milks differ much in the quantity of fat contained in these globules and also in the relative size of the globules themselves. In some milk they are much more uniform in size than in other milk, and in some milk they average twice as large as in other milk. By a very ingenious but simple apparatus these fat globules have been accurately counted and measured in many different samples of milk. They are thus known to vary from 1-4000 of an inch to 1-1500 of an inch in diameter. If we can imagine a lot of these minute globules of fat to be strung along in a line, touching side to side, like so many little beads, it would take from 1500 to 4000 of them, and sometimes 5000, to cover an inch in length. The uses to which milk can be pu', the adaptability of different milks to different dairy purposes, and the commercial value of milk, depend almost wholly upon this fat. The quantity of fat or total number of globules in a given quantity of milk, and the size of the globules, determine the value of the milk. The fluid in which the fat globules appear to float, or are suspended, consists of water (in large part) which holds in solution, a substance called *casein*, which is the curd or cheese-matter of milk,—sugar or "milk-sugar," from which milk derives its sweet taste,—and some mineral matter or salts, which somewhat contribute to its flavor.

The fat, casein, sugar and salts or ash, collectively form the solid matter in the milk and are known as the solids of milk and are generally called the "total solids." The casein, sugar and ash, are spoken of collectively as the "solids not fat." All the rest of milk is water, and, roughly speaking, average cow's milk consists of seven-eighths water and one-eighth solids. This is easy to remember: In a gallon there are eight pints, so in every gallon of milk there are about seven pints of water and about one pint of solid matter.

One gallon of milk contains four quarts weighing not quite 2.16 pounds each, or 8,625 pounds,—just about 8 lbs. 10 oz. avoirdupois.

The water varies from 90 per cent. to 84 per cent. of the total bulk or weight, averaging 87 to 87 1-2 per centum. The less water in milk the more solids. The best milk is that which has the least water.

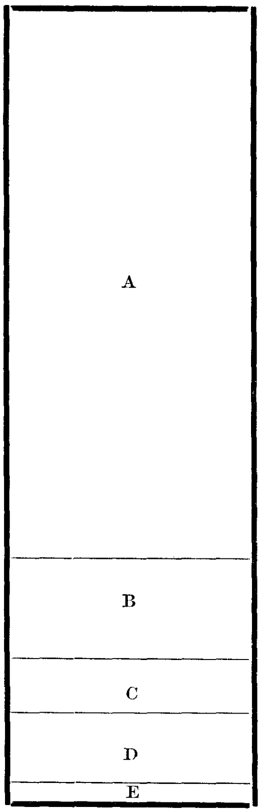
The total solids range, ordinarily, from 10 to 16 per cent. and average 12 1-2 to 13 per cent. The more solids the better the milk; the solids give milk its food value.

The sugar is usually the greatest in quantity of the several parts of the solids but is sometimes exceeded by the fat. The sugar ranges from 4 3-4 to 5 per cent. and averages 4 4-5 per centum. It is all dissolved in the water and is the least variable of the solids in its quantity or proportion to the whole. The water and sugar mixed, would be a colorless, transparent fluid. The manufacture of milk sugar from milk (skim-milk) is now a considerable industry in this country; the sugar is largely used by druggists and in numerous delicate food preparations.

The fat is the most variable constituent of milk. It ranges ordinarily from 2 1-2 to 5 per cent. not infrequently being 6 per cent. The average may be placed at 3 to 3 1-3 per cent. The fat gives to the milk its quality or richness and nearly all its color or opacity. All the yellow color of milk, cream and butter, is in the fat, but is not an essential of the fat; there may be a maximum quantity of fat and yet an entire absence of the yellow color. The most important characteristic of milk-fat is its great variability in quantity. In order to emphasize this, two jars of fat have been added; the three now show this variation as it commonly occurs, and this difference in the quantity or proportion of fat, almost independent of changes in the other solids, makes the difference between poor milk (2 1-2 per cent. or less of fat), average milk (3 or 3 1-3 per cent.,) and rich milk (5 to 6 per cent. fat.)

The casein ranges from 3 to 4 1-4 per cent., averaging about 3 2-3 per centum. It is thus rather more variable than the sugar, but much less so than the fat. This is the curdy portion or cheese of milk; it is albuminous in character and the particularly nutritious portion, upon which the food value of milk almost entirely depends. (Chemists treat the albumen of milk as a distinct part, but for all practical purposes this may be included in the term casein.) The casein is nearly all dissolved in the water, but a little of it is in finely divided insoluble particles. If these jars of water, sugar and casein should be mixed the resulting fluid would be not quite clear, what might be called "murky," but still practically transparent.

The ash is always just about three-fourths of one per cent. of the milk, varying very little. This is the mineral or bone-building part of the milk, and it, also, is nearly all dissolved in the water. Without going into too much detail, the ash includes potash, soda, lime, iron and magnesia, in combination with muriatic, phosphoric and sulphuric acids. The phosphate of lime is the part which does not fully dissolve in the water.



Letter A represents ....Water.
Letter B represents..........Sugar.
Letter C represents.............Fat.
Letter D represents.........Casein.
Letter E represents ....Ash.

The component parts of one gallon of average milk may be thus stated :—

One gallon milk, 138 ounces ; water, $120\frac{1}{2}$ ounces ; solids, $17\frac{1}{2}$ ounces ; sugar, 7 ounces ; fat, 4 ounces ; casein, 5 ounces ; ash, 1 ounce. This is quite fully illustrated by the tube.

Now to repeat,—the water holds almost entirely dissolved, the sugar, casein and ash,—these mixed would still be transparent but for small parts of the casein and ash. These parts form a fluid sometimes called the *serum* of milk, which is, as a whole, a true *solution*. The fat is semi-solid and its globules or particles never unite chemically with the fluid or serum, but are mixed with it, and fluids and fats form what is known as an *emulsion*. The greater the proportion of fat, the richer the milk, the more opaque or "thicker" (perhaps the whiter) it appears. If the fat is gradually removed from the milk it becomes poorer, thinner or more watery in appearance. The difference between fresh or "whole" milk and thoroughly skimmed milk is familiar to the eye. There is no mechanical contrivance which separates all the fat particles from milk ; if this could be done completely, the fluid remaining would be almost as clear as water.

These facts as to the components of milk assist in explaining how milk is formed by nature in the mammary glands of the cow. The udder may be described as composed of four physiological glands, familiarly known as "quarters." These are all more or less connected but the relation is more intimate between the quarters of the same side than between those of opposite sides. The quarters closely resemble one another in construction and milk-making is carried on alike in the four. Each gland is composed of a mass of minute cells supported by tissue and connected with little ducts which join and form larger ones, coming together in one canal leading to the milk cistern just above or at the base of the teat, or main valvular outlet of the quarter. The four are more or less surrounded, connected and covered by tissue of a fatty character, with skin over all and the four outlets or teats.

The udder should not be likened to a vessel, a "bag," or even a sponge. It does not hold any appreciable quantity of completed milk at any one time. The milk cisterns, where alone completed milk can be found in the udder, and this of very poor quality,—are quite small, the four together seldom holding more than a pint. The glands, between the milkings, bring together the materials, store up a considerable quantity of the serum or fluid portion and prepare to make the milk. In the cells of the udder, the fat globules are formed. They are parts of the anatomy of the cow, like the fat in other parts of the animal body; they form by the budding process, ripen, loosen or slough off and are then moved along, floated by the serum, through the ducts and channels, to the cisterns. This final process, the mixing of fats and serum, in due proportion, to make milk, occurs almost wholly during the active operation of milking. The distended udder may indicate that the cow is ready for milking but it is not true that "the udder is full of milk." There is practically no fully formed milk in the udder when the teats are seized by hand or calf. The milk making by nature is co-incident with the act of milking.

This explains the oft observed fact, that the first milk drawn from a cow, after the usual interval, is thin, poor, deficient in fat (globules), while the quality of the milk improves as the milking proceeds, and the last drawn, or "the strippings," is the richest, like rich cream. The serum is formed and moves in advance of the fat globules and milking ceases when the glands cease to supply the fluid in which to float the fat globules from the vesicles or epithelial cells to the outlets. This also explains the reason why, the oftener a cow is milked (within limits) the richer the milk obtained. Further, the fat globule being so closely related to the anatomy of the cow, it may be understood that the size and number of these globules, and hence the quality of the milk is a matter of inheritance, or a breed characteristic A cow descended from a family or breed noted for milk rich in butter fat, is almost certain to possess this characteristic of richness of milk; if she ever gives rich milk, she will always give it, be the quantity of milk great or small.

We know very well that fresh milk cannot be kept long in its sweet state, except by special methods of preservation. Sooner or later it becomes sour. This is due to some controlling influence which acts first, as a rule, upon the milk sugar and causes it to form lactic acid. It may be the heat of the weather, some peculiar effect of the cow's food, peculiar conditions of the atmosphere, or contamination of the milk by exposing it to bad or unusual odors, which hastens the souring or determines the time and activity of the change. In some cases the casein may be the agent to bring on the change. There has heretofore been a very general belief among people handling milk, that, like original sin, the cow conveyed some property to milk, known as animal heat, animal odor, etc , which was detrimental to it and hastened its destruction. This theory has been fully disproved. Some of the agricultural experiment stations have been specially studying the changes and fermentations of milk, and these investigations clearly show that minute germs or organisms known as bacteria, are the active agents by which these changes are brought about. Several species of bacteria have been determined in milk and about dairies, each having a specific effect and these respectively cause acid milk, thick milk, ropy milk, blue milk, etc.

Twenty years ago, no one would have supposed that "the germ theory" of disease had any bearing on dairying, or that bacteria had anything to do with milk. But bacteriology has become a science of itself, with a voluminous literature and we find that some branches of this research have become very practical and of direct importance to all who handle or use milk and its products, in quantities large or small. The characteristics of bacteria cannot be well described here; so much has lately been written of them, that it may be assumed that the nature of bacteria, their wonderful powers of increase and something of their effects, are generally understood. Based upon recent investigations of the bacteria of the dairy, some very positive statements can be made, which would not have been possible a few years ago.

The idea that the souring of milk is a natural process and certain to occur in time, without the intervention of outside influences, has been shown by this new knowledge, to be entirely erroneous. In pure milk, drawn from the udder of a healthy cow, there are no germs of decay or demoralization, but all the changes and fermentations of milk, including common souring, are due to the contamination of the milk with something from the outside, after the fluid leaves the mammary glands of the cow. These organisms all get into the milk from the air, the hands or clothing of the milker, the hair, skin or udder of the cow, and especially from the vessels into which the milk is drawn or in which it is placed while still warm. It is plain, therefore, that the number of mischievous germs present in milk will vary much with the cleanliness used in the dairy and barn. This fully explains why milk from a clean and well-kept dairy, "keeps" so much better than when handled with less care. These points have been experimentally demonstrated. Milk can be drawn from cows so carefully and kept so free from contact with air and any living germs, that it will remain perfectly sweet and unchanged for weeks, although kept in a warm room.

This knowledge of the causes of milk changes and the varied nature and effects of the bacteria of the dairy, is of the highest value. It is of practical application not only in the treatment of new milk, but in making and handling butter and cheese. Great advances in dairying are to come from it, which cannot yet be fully determined and described.

We speak and think of milk, generally, as a fluid or a drink. But milk is really a food, not a drink, and should always be regarded and treated as a food, and valued for its food qualities. The solid parts of milk alone have value,—these are what we want when we buy milk and when we use it. The solids should also be the end and aim of all who produce milk. The more solids contained in a pound, a pint or a gallon, the more food value contained. This fact is recognized by laws in the different states, which base the legal standard for pure milk upon the percentage of the contained solids. The standard varies from 12 to 13 per cent. of solids in different states.

In referring to milk as a food, we at once notice that it combines the three elements required for human life and growth, ash for bones, fat and sugar for heat producers and casein (and albumen) for flesh-forming. And milk is the only article supplied by nature for the young, which is such a perfect food, in right proportions. Rejecting the ash or mineral matter, and milk remains the most complete natural food for man, during all parts of his life. Moreover, nearly all mankind like milk, in one form or another and will use it freely if they have it in abundance. This being true, it is very strange that so little cow's milk is used as a part of the food of individuals and of the family supplies. This seems stranger still, when, upon careful comparison we find that milk at the prices at which it is usually sold, is the cheapest of all foods. Fresh milk, or cheese made from it, which a dollar will buy in any market in this country, contains more material having actual food value, than any other food material which can be purchased for a dollar in the same market. Moreover, this milk is in a form more readily digestible than any other food. And further, the milk and its products, can be more completely used, that is, consumed or prepared for use with less waste, than almost all other food.

The food-value of milk depends upon its curd rather than its fat. All caseinous, nitrogenous or flesh-forming constituents of food are worth more and cost more (in whatever form) than the fatty, carbonaceous or heat-producing constituents; the former occur in large proportion in milk and in still greater proportion in skimmed milk. The food properties of milk fat, of cream and butter, can be obtained in numerous other forms or substances at less cost than in these dairy products. But the food elements of cheese, curd or skim-milk can be had in no other form so cheap. Dairy products as a whole are among the most wholesome, nutritious and economical of foods, and of all these, skimmed milk and skim-cheese are by far the cheapest and best, measured by their actual nutrition or food value. On the other hand, the true food value of cream and butter is so low that these articles should be classed as luxuries rather than as foods. Strange as it seems at first, it should not be forgotten that a pint or a pound of skim-milk is worth more, as food, than a pint or a pound of fresh or whole milk, because the former contains the greater proportion, in the curd, of the most nutritious elements. As skim-milk always sells at much less per quart than whole milk, it is, of course, very much the cheaper form of food.

Milk is an animal product or animal food and can best be compared with other animal foods of which class fresh beef is a standard. In studying the question of household or food economy in this country, we usually find an unfortunate and unreasonably low consumption of milk accompanying a liberal and extravagant use of butcher's meats. By a thoroughly accurate and reliable comparison, based upon their nutritive properties, it has been shown that two quarts of fresh milk have more food value than one pound of good, lean, fresh beef. And as beef is usually cooked and eaten, the nutrients obtained from the purchased pound are little if any more than contained in one quart of milk. Three pints of skim-milk hold more nutriment than a pound of beefsteak. And one pint of skim-milk is worth more, for food, than a mutton-chop weighing a quarter of a pound. In these several cases, the milk as ordinarily retailed costs only one-half to two-thirds as much as its food equivalent in meat.

In nearly all human foods and combinations of foods, as commonly used in this country, there is too much carbonaceous or heat-producing material, like starch and fat, for our best physical condition. And when, in rare cases, more of the heat-making elements are needed, they can always be obtained in cheaper and healthier forms than animal fats, including the fat of milk. The statement may therefore be repeated and emphasized, that for most persons, and for nearly all periods of life, skim-milk is a cheaper and better article of food than whole milk. Aged persons must be excepted, as it is well known they require a very large proportion of heat producers in their food. And with very young children, living almost wholly on milk, a reasonable amount of fat or cream must be allowed. Yet it is a fact that cow's milk, in its natural state, is generally too rich in fat for infants and should be partly skimmed; this is far better than diluting it with water.

With all these facts, which cannot be disputed, it seems very strange that such a prejudice exists against skim-milk. This prejudice even goes to the extent of prohibiting its sale in some places. In the states of New York and Maryland, for example, it is a criminal offense to sell skim-milk in the cities and towns. In the cities of New York, Brooklyn and Baltimore, as well as other places, the boards of health,—whose members really know better,—enforce the laws so as to seize and destroy all skimmed and half-skimmed milk offered for sale. By this absurd and really wicked action, the people of those cities are deprived of a wholesome food, which might be sold at prices making it an actual blessing to thousands of the poorer classes. Such milk should certainly not be sold fraudulently as whole milk, but it is not difficult to regulate the trade so as to prevent fraud. The sale of skim-milk as allowed and practiced in Boston and Philadelphia saves the citizens of those cities many dollars annually, besides being of very great benefit in a sanitary point of view.

It should be noted that what has been said of milk and skim-milk as human food, applies to the feeding of all animals of the farm and especially the young animals. The feeding value of skim-milk on the farm should be especially studied, both alone and in combination with other foods. In creamery and butter-making districts, where there is so much of it, the best use of skim-milk is really a matter of great importance. Butter-milk has, usually, as much feeding value as skim-milk and sometimes more, but this is not because of the greater proportion of fat in it.

The time given to this branch of the subject is justified by its importance. The value of milk as an article of food, on the farm as well as in the town, is not fully appreciated. Everywhere its consumption could be largely increased to good advantage. And this is even more true as to skim-milk. As an article of local trade, in the supply of cities and towns, in household economy and the family dietary and on the farm, skim-milk should receive more attention and be used largely and judiciously.

THURSDAY, P. M. Meeting called to order at 1.30.

THE BOVINE SUPPLY OF HUMAN FOOD.

Stenographic Report of a Lecture by Prof. W. H. JORDAN, Director of Experiment Station, Orono.

Mr. Chairman, Ladies and Gentlemen: The talk which I am going to give you this afternoon is, so far as I am concerned, an experiment. My business has so much to do with the making of experiments that I cannot refrain sometimes from making experiments on audiences. I do not know how well you will like it,—the fact is, I do not know how well I shall like it myself. I shall like it probably just about as well as you do, because if you like it I shall. I am going to divert the discussion this afternoon, somewhat, for a time at least, from the lines that have been laid down during the last day and a half, and instead of trying to find out whether turnips feed flavor into butter, or whether we can continue to make butter with some cotton seed meal, or whether we cannot transform the cow by her food, and a thousand and one other questions, I want to go below all these questions to certain fundamentals that affect the dairy business more profoundly than any of the questions we have been talking about. It may be my egotism which causes me to say that, but you will have to excuse me.

Now it is fundamentally true that the dairy business is not carried on for the sake of the dairy business but for the sake of human beings. Cows eat in order that we may eat. Every operation of the farm, every business operation in this broad country and in this whole world, has reference to the final good of humanity; and when we can show facts that have a fundamental relation to the good of humanity, and a relation to a particular business, we are getting at fundamentals. We reverse that thing often in our judgment, friends. I know of farmers who live for their farms, and they are drudges,—they are slaves in a sense. They do not allow themselves the rights of human beings in order that they may accomplish this or that or the other. But we must remember that the farm exists for the man, and that if he makes the farm better without that conducing to make him better, happier and more prosperous as a human being, his labor in making the farm better is lost effort All effort, then, is directed toward the good of humanity.

Now what I have to deal with to-day pertains to certain fundamentals in the cost of human food; and I want to say that this is a dairy meeting with the old cow as the central subject, and that in what I have to say the old cow will not suffer to the least extent by any comparison that I may make.

The cost of human food involves, we may say, two factors: the farmer is a producer of human food, he has in his barn and at his command that he has purchased, certain cattle foods. While those involve labor back of his having them in his possession, we will not consider that element of labor, but we will simply consider those foods as one of the elements in production. Now his labor in converting those foods into milk, meat, etc., is another factor in the cost of human food. Now the less the cost on the side of the cattle foods, under certain conditions, the greater the factor of his labor, that he can put in a remunerative and intelligent way. But I will not enlarge on that. I do not know that the old discussion which has been going through the papers has any point in the State of Maine to-day, and yet I want to bring it forward because I have some fundamental facts belonging to it. It is a discussion carried on by our friends in the West, as to the relative cost of a pound of butter and a pound of meat, and that discussion has been handed back and forth. One man has said one thing and another man has said another thing, based on personal experience.

But I am so egotistic again as to believe that the figures which I present to you to-day are the first figures based upon a careful review of average experience, and this is the first time they have been given. Now, friends, how do we get at figures that are to be depended upon? I get very much out of patience with things that men say sometimes. I suppose I must be excused, but it is not because of my egotism this time, though that answers for a good many of my sins. I have gone through some years of experience and investigation in experimental work, and have found out that to prove a thing means a good deal. I say it in no spirit of disparagement, but there are very few men who know what it means to prove a thing.

We have lots of verdicts based on individual experience, but unless the man who has the experience has eyes to see, I do not place great weight on his experience. Unless his instruments of experience, the things that he deals with to furnish him experience, are of an exact kind, I will be excused for placing a very light estimate on his experience in the face of experience of a more exact kind. You will not criticise me for saying that, I am bound to say it out of the convictions that have grown upon me in my life work. And so I personally,—and it would be strange if it were not so,—have more faith in the results worked out by the fifty-five experiment stations of the United States than I have in popular notions. There is nothing in this world that may be so full of error as a popular notion. It is said, you know, that "Where there is smoke there must be fire," and I will acknowledge that any wide spread conviction on the part of the public deserves respectful consideration, deserves respectful analysis; and the convictions of men should not be "run down their throats." Nevertheless I have seen so many popular notions exploded, I have seen the public go wild so many times over this fad and that fad, while it has been necessary for a man to investigate with patience and keep steadily on with the conviction that exact work will come out right in the end, that I am coming to have a respect for exact work. Do you remember when the ensilage question first came to the front? It was said by so many that the processes of the silo increase the value of the material!

You probably do not remember what I said, because I never was of sufficient importance for a great many people to remember what I say, but I did say, and a great many other men who were students of science said "hold on! That is necessarily an error."

We have simply held our grip, kept on "sawing wood," and the public has come to recognize the truth of the position that the men of exact experience held.

Now I am going to bring you to-day results based upon this exact experienee. What do I mean by exact experience? It is often claimed, you know, that if you can point out an error in a thing that thing falls to the ground. That is, if the chemist cannot analyze the thing to the absoluteness of exactness his results are not good for anything. It is true in experiment station work, as it is true in everything, that there is a percentage of error. Even the man who uses the most exact instruments has his individual factor of error. The most precise instrument on the face of the earth for doing any kind of scientific work has its percentage of error; and when we talk about exactness we mean relative exactness.

How did I come to get at this range of figures? Many of you here doubtless know that when the World's Fair was contemplated the office of the Experiment Station at Washington in conjunction with the Secretary of Agriculture, decided that it was time for the experiment stations of the country to make an exhibit of what they were doing. And so the United States appropriated a certain amount of money to be used in conjunction with the fifty odd experiment stations, also in conjunction with the State Colleges, to make an exhibit at Chicago that should be called "An exhibit of Colleges and Experiment Stations" in the Agricultural Building. A generous amount of space was devoted to that purpose, and a committee was appointed on the part of the colleges and experiment stations to take the matter in charge; that committee selected others to help them in special lines, and I was very gratified to be asked to take charge of the work in animal nutrition. It is of no use to recount the long months of labor that it involved. I began to contemplate, What shall I exhibit? I cannot take an animal to pieces and show the machine running. I cannot show the food being digested in the stomach and taken into the blood and carried out through the arteries into the capillaries, and doing its work. That kind of a loom does not weave so that we can see it. We saw the looms weaving fine fabrics, but the processes of the animal are too fine to be seen by any ordinary method. What could I show? I had a good deal of consultation with Dr. Aubert and other men who are interested in this kind of work, and I made up my mind after thinking of it for a long time that there had been quite a good many exact feeding experiments, and I would attempt to show the relation between the feed used and the thing produced with the various classes of animals. I tried to show not only that, in general terms, but also the influence of a wide and a narrow ration, not only upon the amount of growth, but upon the constitution of the animal bodies that were fed in these special ways. Those and like subjects I shall not say anything about this afternoon; but what I want to present are some of these general figures on the charts before you, hoping that what I may say will be the starting point from a somewhat exact basis, for further discussion, and that the facts may finally filter into the public comprehension, and be useful in satisfying us what is profitable, and what are the fundamentals of our business.

Now that involved a great deal of work. What I did was to take down from my shelves one by one every bulletin and every report issued by the fifty odd experiment stations and pick out every experiment made with cows or steers or sheep, and determine whether in my judgment the data were accurate, and the thing well planned, and the facts sufficient to enable me to take it as a reliable experiment; and I took those, with the help of young men whom I hired by the hour to make abstracts for me, and worked out a certain number of figures.

The remainder of what I have to say this afternoon will be principally the explanation of these charts, and such explanations based upon them as you may wish to ask for. I have placed in these headings, cows for the production of milk, swine for growth, bovine for growth, (mostly steers at various ages,—but one experment in fattening cows) and sheep for growth. It is interesting to note the number of states in which these reliable experiments have been carried on. In twenty states experiment stations have carried on experiments with regard to the production of milk; in thirteen states with regard to the growth of steers; and in five states with regard to the growth of lambs. The experiments which I used included 60 with cows, 277 with swine, 31 with steers and 12 with sheep; making 380 different experiments that had to be reviewed, involving 2140 animals. Now, friends, I think you will agree with me that so far as averages mean anything,—and a great deal of what we call the fundamental exact data of the world comes from averages,—there is a pretty good mass of material; 380 experiments, involving results with 2140 animals. Now what did I have to do in order to get at my data? I had to get in each experiment the number of pounds and the kind of food, and in most cases the composition of the food. I had to use the amount of food and its composition, the growth of the animal, or the milk produced and the composition of the milk.

We had to go through every experiment and calculate the amount of digestible food. I prepared blanks and sent to every experiment station where these experiments had been made, and said, "My dear friends, will you please calculate these results as I ask you to, in order to help me?" I got about one-half calculated by the men who made the experiments, and the rest of them I had to calculate myself with the help of one or two young men. We calculated in each experiment the amount of digestible food. We took the amount of digestible food, because it is of no use to take the total weight of food as a basis of calculation or comparison. For instance, how much does it take to support a pig as compared with a cow? The pig eats concentrated food, highly digestible, and the cow coarse food, which is not so digestible. You have got to take the amount of digestible food that the animal takes care of in order to get at the fundamental basis of growth.

On the first chart I have the figures as to the amount of digestible food consumed by the various classes of animals per 1,000 pounds live weight. We found that the cow consumed in one day per 1,000 pounds weight, 15.3 pounds of digestible food, and the swine used up 24.8 pounds; in other words, that you are feeding the pig a good deal more in proportion to his weight than you are the cow. The experimenters in feeding for growth, have fed to 1,000 pounds weight of steer in one day only 12.6 pounds of digestible food, and to 1,000 pounds weight of sheep, 18 pounds of digestible food. The steer stands at the bottom, the cow stands next, the sheep next and the pig at the top. The pig is a pretty successful fellow; if you give him a chance he will get away with a good deal. Those are the figures for the relative daily consumption of food per 1,000 pounds of live weight

Now what is the relation of this consumption to the actual thing produced that is going to serve as human food. We find that to produce 100 pounds of milk, containing the average per cent of solids, namely 13 per cent, 72 pounds of digestible food were used up. For 10 pounds of live weight of pig 32.9 pounds of digestible food; for 10 pounds live weight of steer, 74 pounds; for 10 pounds live weight of lamb, 72 pounds. In other words the food that will produce 100 pounds of milk, containing 13 per cent solids, will produce about 10 pounds of steer, and about 10 pounds of mutton, speaking without reference to the slight difference shown in the table. Now let me say right here, do not go home and say "I know better, because with a certain pair of steers last year I did so and so, while my cows only did so and so." Do you know that your cows are average cows and your steers average steers? A fine short-horned steer as compared with a poor scrub cow would not show that relation; the most magnificent Jersey cow as compared with a scrub steer would not show that relation; but that is the average relation, and I examined the figures very carefully to see how the comparison held between first class cows and first class steers, and the average relations were about the same.

When you come to the pig, so far as growth is concerned he gives you 10 pounds of growth for less than half the amount of digestible food that you get 10 pounds of growth for with either the steer or the lamb. I am speaking now of live weight. You remember we began to talk of this with reference to the human food question, and live weight, or gross weight are no standards to take of production. Did you ever stop to think of the waste there is in the body of an animal before it gets to the human mouth? Did you ever stop to think, as of course you have, that the body of a steer or a lamb or a pig contains a very large percentage of water? A year ago Laws & Gilbert of England made analyses of the bodies of steers, pigs and sheep, and within a few years Prof. Atwater, whom you have heard a great deal about, and Mr. Woods have been making special analyses of the carcasses of beef, the ox or the steer, and mutton; and so we have those analyses as a basis upon which to make certain determinations as to what the body of the animal actually contains after you have produced it. And let me say that the analyses made by Messrs. Atwater and Woods, and the analyses of our distinguished friends across the water agree very nearly,—there is no essential disagreement in their results. It appears from the analysis of Laws and Gilbert, made of the entire body of animals of different kinds (and by the way, the experiment station expects to distinguish itself this winter by making an analysis of the bodies of four steers), that the actual dry matter, after you have dried out the water,—for instance, the amount you would have left if you should put an animal into an immense drying machine and dry out of him the water merely,—would be in the case of swine, 56 per cent, in the case of bovine, 52 per cent, and

POTATO FIELD OF BARNEY McLAUGHLIN, LIMESTONE, AROOSTOOK COUNTY, ME.

in the case of sheep, 48 per cent. In other words, 44 pounds out of 100 are dried out of the swine, 48 out of 100 out of the steers, and 52 out of 100 out of the sheep; whereas of course in 100 pounds of milk you would have about an average of 87 pounds of water. Now my objective point is to get at the amount of matter that we actually eat. I shall have to do two things, I have to find out what the dressed weight is, and what the composition of the dressed carcass is. I took slaughter tests as I could find them, where the records are accurately kept, and I found that in the case of 69 steers the dressed weight of the carcasses averaged 61.4 per cent of the steer. That is, if he weighed 1,000 pounds live weight, the dressed weight would be 614 pounds. Those figures varied in the case of 69 animals from 58 to 66. In the case of 48 lambs the variation was from 48 to 55 per cent, an average of 50.7 per cent; in the case of 97 swine, where the records were very carefully kept, the average was 81.2 per cent; and the dressed weight of milk is 100 per cent. We have now to find out what the composition of this dressed carcass is. First of all, how much of the carcass is edible, or how much waste is there? It has been ascertained that, taking the actual edible part and throwing away that which nobody would ever think of eating, we throw away in the case of beef 18.5 per cent; in the case of a side of mutton, 17.3 per cent; and I made an estimate myself on the basis of the weight of the bones of the carcass of the swine, and found that we throw away twelve pounds out of every hundred. Nothing is thrown away in the case of milk.

Now, how much dry matter is there in the part that we eat? In milk there is 13 per cent dry matter; in the part that we eat of pork, 61.5 per cent; of beef, 48 per cent; and of mutton, 42 per cent. So that the total amount of edible dry matter in the carcass is, in the case of swine, 53 per cent; in the case of the steer, 39 per cent; and in the case of the sheep, 34.7 or practically 35 per cent.

Now how is it in the case of the total body,—take the animal as he stands on his feet before you kill him? We will take this as a final summary. There is 13 per cent of edible dry matter in the milk that we eat; taking the pig as he stands on his four feet before you kill him, we eat about 44 pounds of dry matter for every 100 pounds of pig; of the live steer, including his horns and hoofs—the whole of him—we get only about 24 pounds of edible dry matter for every 100 pounds, or only about one-fourth of his weight; and in the case of the lamb you will only have out of every 100 pounds about 18 pounds of edible dry matter. Now let us carry it down to 1,000 pounds. We shall have in the case of milk, 130 pounds; pigs, 439 pounds; steers, 240 pounds; and lambs, 176 pounds. That is, the 1,000 pound steer, as he stands on his feet, will furnish to the human family 240 pounds of edible dry matter only.

We have a cow at Orono, Old Agnes, that is fortunate in being a good Jersey cow, and will make about 400 pounds of butter a year. That cow produces about 1,000 pounds of dry matter every year. She produces as much human food in one year as four 1,000 pound steers contain in their entire bodies. (Prof. Gowell asks for repetition) *She produces as much human food in one year as is contained in the carcasses of four steers weighing 1,000 pounds each.* The pig carries more food in proportion to his weight; I tell you we cannot count the pig out yet,—he is here to stay. Next to the cow he is the greatest food maker that we have, barring the hen. The State is going to build a fine poultry plant for us, and we are going to have some data before we get through on what it costs to make a pound of human food with the hen; and I am inclined to think that before we get through all the roosters will crow.

Now, having shown what these different classes of human food, as produced by the different classes of animals, contain—the butcher's analysis and the chemist's analysis,—let us show the relation of this digestible food to some fundamental figures. Taking the figures of two of our charts, which rest upon a large number of experiments, we find that it takes 5.55 pounds of digestible cattle food to produce one pound of dry matter; it takes 5.9 pounds of digestible cattle food to produce one pound of dry matter in the carcass of the swine; 14.2 pounds of digestible cattle food to produce one pound of dry matter in the carcass of the steer; and 15 pounds digestible cattle food to produce one pound dry matter in the carcass of the sheep. This is total dry matter; and I have shown you that you throw away a great deal of the dry matter. Let us take the edible solids. To produce one pound of edible solids, that is, edible human food solids, 5.55 pounds of digestible food are required in the case of milk; (everything in milk is edible, and there is no better food on the face of the earth.) 7.50 pounds of digestible food are required to produce one pound of edible swine solids, if you regard any of it as edible; 30.8 pounds of digestible food to produce one pound of edible solids in the steer; and 40.9 pounds of digestible food to produce one pound of edible solids in the lamb.

Now about dressed carcasses:—To make a pound of butter, allowing the average percentage of water in butter, it takes about 15.3 pounds of digestible cattle food; to make a pound of dressed beef, as we sell it in the market, 12 pounds of digestible cattle food; 4 pounds digestible food for one pound of pork; and 14 pounds digestible food for one pound of mutton. It does not appear to me that you can quite make a pound of butter for what you can make a pound of beef. It takes 18 pounds of digestible food for one pound of butter fat,—15.3 for one pound of butter.

Twelve pounds of digestible cattle food for a pound of dressed beef, and 15 pounds of digestible cattle food for a pound of butter;—now let us see what this means Let us take beef and milk and drop the others out. How much of these substances will 100 pounds of digestible cattle food produce? One hundred pounds of digestible cattle food will produce 5.5 pounds of butter fat, 6.5 pounds of butter, 14.6 pounds of green cheese, and 8 1-3 pounds of beef. What will produce 6 1-2 pounds of butter will produce 8 1-3 pounds of beef, as it hangs in the market. Again, bringing that down to the edibles.—the edible dry matter in beef costs almost six times what the edible dry matter in milk costs. But I have not said anything about the labor element.

Ques. Would it be quite fair to take butter as a criterion of the food value of milk, and butter only, in comparison with meat?

Ans. No; this 6.5 pounds of edible carcass contains, roughly speaking, about 3 1-4 pounds of edible dry matter. Now butter, we will say, is 80 per cent fat; that will be 5.2 pounds of solid dry edible matter against 3 1-4 pounds, rough calculation. Of course we have based our comparison here on total edible solids.

Ques. Compare it with cheese if you will.

Ans. What will make 8 1-3 pounds of beef will make 14.6 pounds of green cheese, which is probably 1-3 water; that is there is probably 9 1-2 pounds of dry matter in the cheese against 3 1-4 pounds of dry matter in the beef; and the one is as valuable to eat as the other.

Ques. What is the percentage of comparison between a pound of green cheese and a pound of dressed beef in actual food value?

Ans. On the average a pound of cheese contains about 36 per cent water, and a pound of beef steak about 60 per cent. Hence there is $1\frac{1}{2}$ times as much nutrition in a pound of cheese as in a pound of beef steak. Calling a pound of beef 100, a pound of cheese would be 165; or 100 pounds of cheese would be worth as much to eat, provided you can eat it, as 165 pounds of beef. I have compared dairy products with the dressed weight of beef, pork and mutton; but when you come to edible dry food, 100 pounds of digestible cattle food will produce 13.3 pounds of pork, 3.25 pounds of beef and 2.44 pounds of mutton. You will see that there is nearly three times as much edible human food produced in milk from a given weight of digestible cattle food, as there is in beef. Now, I have said nothing about the work element. Of course it costs more to run a dairy cow than it does to run a beef creature; there is where the element of labor comes in on your part. That is to be determined by yourselves, I have nothing to say about it; I have simply rested this talk back upon the original food cost. Another thing that I would say is that these experiments are based upon food consumed by the cow while she is actually giving milk. She is going to rest a certain time and that must be counted out against her. The length of time she rests will be determined by the cow, and that you must calculate into the problem for yourselves.

One or two things more I want to mention, one especially, and that is the relation of the food value of whole milk to the food value of butter. You know that there is a law in some states that skimmed milk shall not be sold on the ground that if any is allowed to be sold some will be sold for whole milk. If we throw away skimmed milk and do not use it for human food, (of course it must go somewhere if we make butter) we are throwing away 43 per cent of the food value of the whole milk, on the average. When we manufacture cheese and put that on the market only the whey is thrown away.

Ques. Would the loss in whey be half as much as the loss in skimmed milk?

Ans. It would be more than half. There is in every 100 pounds of milk on the average about 4.95 pounds of milk sugar and about 3.3 pounds of nitrogenous matter. When you make butter you throw away the nitrogenous part and the sugar. When you make cheese you throw away chiefly, only the sugar; but a pound of sugar will furnish as much energy,—to take the general office of food into consideration,—as a pound of nitrogenous matter; so that in throwing away 4.95 pounds of sugar you are losing more than half as much as you would lose by throwing away both the nitrogenous part and the sugar. In making cheese you are saving not only the fat but the nitrogenous part; whereas when you make butter you throw away in the skimmed milk all of both.

Ques. How much is skimmed milk worth to feed to pigs?

Ans. Exact figures are dangerous to the man that gives them, sometimes to the man that accepts them. In a good many instances where skimmed milk has been fed to swine, together with some grains at average prices, the man feeding it has been able to get back twenty-five cents per 100 pounds for the skimmed milk.

Ques. You say it is wise to feed it with certain grains. Would you specify the kind of grains most valuable with skimmed milk?

Ans. The kind would depend somewhat upon market prices. At the rate for which we have ordinarily been able to buy corn meal I do not believe there is anything better. Middlings will also do well.

Ques. Would you rather feed flour to a young pig than Indian meal?

Ans. I should fully as soon feed flour or fine middlings, taking the life of the pig as a whole. The young pig will stand it all right on plenty of skimmed milk and not too much corn meal.

Ques. How is buttermilk, compared with skimmed milk?

Ans. Not worth as much. We have got to base the value of food upon its percentage of solid matter, and buttermilk will run about one per cent lower than skimmed milk. There is probably a somewhat higher relative amount of sugar in the buttermilk, but I will not split hairs on that.

Ques. Would you advise any one to feed gluten meal to a pig?

Ans. Not to young animals. We have, in experiment work with swine, fed to animals of 100 or 150 pounds all right, but we tried it on some young pigs, together with skimmed milk, and they laid down on their sides and staid there. They were not dead but had lost their understanding.

Ques. Why did the gluten meal have that effect upon the pigs?

Ans. I do not know that I can tell you the cause, certainly, but I can give you a notion. Gluten meal is a by-product of the manufacture of glucose and starch. The processes through which the ground corn is put in the manufacture of those substances take out a very large part of the mineral matter that the corn originally contained; especially in the manufacture of glucose, because then the corn is treated with dilute sulphuric acid, and it is a fact that analysis shows that glucose meal contains a very small percentage of mineral matter. Corn contains little enough; and we have more than half suspected that corn is not well adapted to furnishing skeletons for animals. When you come to subtract from the corn a large part of the mineral matter, especially the phosphates, you have food which is totally unfitted to furnish the mineral matter needed in the growing frame of a young animal. I have said a good many times on paper and before the public, that I believe that gluten meal that is to be fed quite freely in comparison with other grains, should have as an amendment some bone meal, even to the cow manufacturing milk, because the cow is forced to put into the milk a good deal of mineral matter which will go to make up the bony frame of the calf.

Ques. Would you advise dairymen to feed bone meal?

Ans. I would advise dairymen, if they are going to feed gluten to feed bone meal quite often, because you cannot get something out of nothing.

Ques. Is it necessary to put in any potash?

Ans. No, sir; I think not. Hard wood ashes would do the work as well as bone meal, but you would want only a small quantity, not enough to convert the cow into soap.

I just want to say one more word about these figures in closing. The figures are convincing to me,—whether they are to you or not,—that as a source of human food the dairy cow stands unexcelled; and to my mind she stands unexcelled also in the matter of economy of production; and this one fact means more to me as to the stability and future prosperity of the dairy industry than any of the more superficial figures that we may be able to bring forward.

The cow which the village workman, who works in the mill, owns, is furnishing him a supply of animal food for his family more cheaply than he can obtain it in any other way, or in any other form, save, as I said, possibly eggs and possibly to a limited extent the fat pork which he buys.

Ques. The product of the cow and the product of the pig are the cheapest edibles that we can get, then, from the dollars and cents standpoint?

Ans. So far as food cost is concerned. yes, sir. Even if you take it on the basis of what you buy in the market. A pound of cheese, costing you 15 cents will furnish you the dry matter for 20 cents per pound; but if you buy beef steak at 20 cents per pound the dry matter will cost you at least 50 cents per pound, 2½ times as much.

Ques. Have you or any one else at the experiment station ever made any experiments with buttermilk as a fertilizer?

Ans. We have not, because on the face of it, it would really be a waste of time. I suppose if a person has a lot of buttermilk which he must throw away he can spread it on the land, and I have seen some instances where buttermilk was spilled on the land and the growth was tremendous. There is no question as to the fertilizing value of the dry matter of buttermilk, but why not feed it, and get the feeding value and still have 8-10 in the manure? Why throw it on the land and waste the feeding value when by feeding it you can also have 8-10 of the fertilizing value?

Ques. I would like to have you say something in regard to feeding common hay and cotton-seed meal. Will it injure the butter to feed cotton-seed meal?

Ans. You must not question me very much on butter flavors from the standpoint of a commercial man. I was very much surprised to hear Mr. Harris say that there is in the market a recognized flavor that is known as the "Cotton-seed flavor." (Not that I doubted him, because I did not feel that I knew enough about it to doubt him.) Still, he said he thought it was possible that a certain amount of cotton-seed might be fed without that flavor coming to the front. It is not fair to criticise Mr. Harris in his absence, and I am not in possession of the data which he possesses, but granting that there is in the market what is known as the "Cotton-seed flavor," have the market men been able to trace that back from the product in the market to the farm so accurately that they know that it is cotton seed that produces the flavor?

There are a great many things that determine flavor, from the food way down to the tub that the butter is carried in, and have we found out with an accuracy that will enable us to take it as a certain fact, that the cotton seed meal is behind this peculiar flavor? I asked Mr. Harris the question and he made this reply: he said, "We think that in some instances we have traced that." But he was ready to acknowledge to me that there was a chance for greater accuracy in that line. He simply said: "We know that we have in the market what we call that flavor,—that is the great fact to us." But whether we must drop cotton seed because of the bad flavor in the butter, is a question that I do not think is determined. I am not ready to accept that position. I think we need to trace it out a little more closely. As to feeding hay and cotton seed, it is entirely possible and reasonable that an entire ration of cotton seed may make a modified flavor in butter. It is entirely possible that the feeding wholly on any grain may make a modified flavor, as compared with the flavor of some other food; but as I understand it from the chemist's side, flavor is chiefly the product of manipulation and treatment. Food is also a factor, but as we ordinarily speak of flavor, it is chiefly the product of the manner in which the milk or cream and the butter are handled. That seems to me a conservative, reasonable view.

Ques. Would you feed other grains with the cotton seed?

Ans. I would do so unless other grains were "in the air" tremendously, not only from the flavor but from the rational feeding side. I am a little doubtful as to the advisability of putting a food containing 42 per cent of nitrogenous matter at 6 pounds per day, into the crib of a cow. Let me give my reason for saying this. It is not based so much on experience, as I know of one herd of cows that was fed on cotton-seed at the rate of some eight or ten pounds per day all winter, and they seemed to come out all right; but as a steady thing, as affecting the welfare of the cow, I will give you the reasons why I object to it. The part of the food that is digested passes into the blood and certain uses are made of it, and the refuse from the manufacture of milk passes out, in the case of the nitrogenous portions, through the kidneys. It is placing upon those particular organs a tremendous amount of work to feed the animal a food so highly nitrogenous. Eight-tenths of the nitrogenous matter will pass away from the animal, and will be eliminated by the special functions of the kidneys. It has been observed, in the case of swine particularly, that a young animal fed upon a large amount of nitrogenous food will have larger kidneys than other animals which have been fed upon food containing less nitrogen.

Ques. I think the general tendency of the forenoon meeting has been to throw aside cotton-seed. Now we have been feeding cotton-seed as part ration with other grains. Are we wrong in doing so or are we right?

Ans. We will concede to the market expert the unquestioned ability to judge flavor in butter; we will also concede the accuracy of the statement of the market man when he says that there are in the market certain flavors that have certain names; but I, personally, am not ready to concede that he has established his case in making a connection between those flavors and the food. I believe we have yet no substantial ground for dropping cotton-seed out of our ration. I do not say this in criticism or disparagement of any expert, but I believe that this is good conservative ground.

One of the well recognized facts in feeding to-day is that the addition of nitrogenous food, like linseed and cotton-seed meal, is of great advantage to the ration; that we can produce more milk by a balanced ration of that than by an unbalanced ration.

We need evidence of the same value and reliability to cause us to throw cotton-seed out of the way, and I do not believe we have it yet.

Ques. The answer you have given relates to feeding it in a mixed grain ration. Now, at an institute held not long ago the fact came up that a certain dairyman was feeding to a small three-year-old Jersey heifer, in connection with a large quantity of early cut hay, mostly clover, four quarts of cotton-seed meal per day. What have you to say to that practice?

Ans. I have no doubt but that it can be done and will produce a good quantity of milk, and the cow will go through the season all right. But I have to say what I said to a farmer once "You are foolish to do it." I certainly could not advise the feeding of a good sized grain ration purely of cotton-seed.

Ques. What is there in three pounds of cotton-seed meal that should impart a flavor so very much stronger than that produced by any other meal?

Ans. If the cotton-seed meal is good, light yellow and sweet to the taste, I know of nothing. This is to be said in regard to cotton-seed;—there comes to my hand occasionally, through the mail or by express,—very rarely by purchase,—cotton-seed meal that is dark in color and slightly musty, and sometimes has a fermented taste. I can understand how material of that kind may have an influence upon the butter,—I would not deny that; but if it is what it should be I know of no reason why it should produce an objectional flavor in the butter. And let me say here, look the cotton-seed meal over that you buy. First of all send your oldest down to the short course and let him learn what a good sample of cotton-seed meal is.

Ques. It seems as though there is a current of thought aroused as to cotton-seed being the cause of a poor quality of butter. Why should people care to feed an entire grain ration of cotton seed?

We know a mixture is more sensible. Should not we expect some flavor from any one grain introduced into the animal rotation before she has had an opportunity to get into sympathy with it?

The State of Maine produces as good butter as is produced in any state in the Union, and cotton-seed meal is largely used.

Ans. I am not going to stand here on the platform and say in an official way that Mr. Harris does not know anything about this matter; but I have said that I do not believe that he has established a connection between the fact on the one hand and the fact on the other. It seems to me that this is enough to say. I do not believe that the farmers of the State would have any right on the basis of any information which they now have, to discard cotton-seed.

Ques. You would not feed ten pounds of it a day to a young heifer?

Ans. Not unless I was experimenting on various mild ways of killing her.

Ques. If I have a cow that gives six or eight quarts of milk, and should milk perhaps six quarts from her, and then bring the last two quarts here to you to be tested, will not that test be higher than the test which would have been obtained from the entire eight quarts?

Ans. The chemist in charge of the testing reported to this audience yesterday an analysis of the first portion and the last of milk drawn from the same cow at one milking, and the first portion tested between 1 and 2 per cent fat, and the last 11 per cent fat.

Ques. Has Prof. Jordan ever had any experience in feeding wheat bran alone, and its causing a bitter taste in the milk?

Ans. No, sir.

Mr. Nichols of Foxcroft was now called upon to give his opinion with regard to cotton-seed meal.

Mr. Nichols—I should say that cotton-seed should not be discarded; it is my opinion that it does not impart a bad flavor to the butter. In my factory I do not send butter to Boston during the summer, but commence to send in the fall. About four years ago when I commenced to send it I got word back from the commission men that my butter was not up to standard; and they made the inquiry if my patrons were feeding an excess of cotton-seed meal? I did not know in regard to that, but I discovered that the color that I put into the butter was quite old and had become oily. I got some other color and said nothing to my patrons. They kept on feeding cotton-seed meal, I changed my color, and the butter was all right. There was one point scored for the cotton-seed.

Another thing: I know that every patron who helped to produce the tub butter which scored the highest point yesterday feeds cotton-seed meal.

THE COOKERY OF MILK AND CHEESE.

Report of a lecture given before the Maine State Dairy Conference by ANNA BARROWS.

This afternoon, while I sat here listening to the remarks of the gentlemen who took part in the exercises, I thought myself brave indeed to attempt to say anything more in regard to butter, milk and cheese; but then I thought that after all, as some one has well said, "All the ships of ocean are sailing to men's mouths," and all the work of the farmers is for the gratification of our appetites and the nourishment of our bodies, and many times the work of the farmer is utterly, or nearly, wasted, because of the improper use of the foods in our households and in our kitchens. So perhaps it is not out of place after all to take up the cookery of these common foods to-night. I doubt if I present very much that is new to you in the line of the cookery of butter and milk and cheese, but I may be able to group the facts in a little different way from that in which we are accustomed to think of them.

We may look at the cookery of all foods from different standpoints. We prepare our foods, as I said a moment ago, for the gratification of the palate; and many of us never get any farther than that; but that is a small part of the cookery of food. We want the food to nourish the body so that we may be able to do the work which falls to our share in this world. Ordinarily if the food is made palatable it will be digestible and nutritious; but our appetites are often warped by habit. It is very curious to study our own tastes and see how we may grow to like something that was utterly distasteful to us in the first place. How many times we are surprised when we study foods to find that we have come to like those that are neither digestible nor nutritious. We have cared more about the bodies of the animals than about our own bodies, we have studied to see how to get the most work, and the best work from our animals without applying the same sort of reasoning to ourselves.

In talking about milk we must remember that it is a complex food in spite of its apparent simplicity; and in it are found all the classes of food which we really need for sustenance. These different classes of food are not many, but it is quite necessary that we should have some of all kinds every day and every meal, and in the case of milk we have them grouped in good proportions, although not suited to all kinds of life and work. It is an easy matter to remember these different food principles simply by the number of fingers on one hand. The first and great food of all—one that we are seldom inclined to class as a food—is water; and that, of course, is very abundant in a fluid like milk. The next class in bulk would be the carbo-hydrates, including starch and sugars, which in milk would be represented by the milk-sugar. Then come the fats, and then the protein or proteid matters and the mineral matters. These five food substances we have to deal with over and over again in slightly different forms, and it is necessary that we should become familiar with them. Some writers on food give them slightly different names, but meaning the same thing after all.

It is a very old story to tell such an audience as this that milk contains 87 per cent water, a little less than one per cent mineral matter, and 12 per cent other solids, which are variously divided between the carbo-hydrates, proteid matters and fats. They vary, of course, in different samples of milk, and the farmer who is looking for butter is aiming to get as great a proportion of fat as possible in the milk. I think most of the best authorities agree that milk is generally in the best form for use as food when these three substances are in nearly equal proportion; at least for our common use it is safe enough to think of them in that way. These three substances are very unlike, and we find that in cookery they are affected differently by the same degree of heat; so that even when we come to study such a simple substance as milk we have to think of its complex nature and the way in which these different substances are affected by heat.

That brings us to a point in cookery that as yet we have hardly begun to know anything about. We have been accustomed to putting our foods on top of the stove, or in the oven, and leaving the fire to do the rest, without much regard as to whether it was a slow or a hot fire, or whether one temperature would be better suited to one class of food than another. This is a subject that we are just beginning to study, aud which must be studied more and more before we can get the best results in cookery.

At first we might think that there is little cookery necessary for milk. We are so accustomed to take milk directly from the cow that we do not think about the cookery of it. I heard a gentlemen who has made a study of this matter say, a few years ago, that he thought the time was rapidly approaching when we should be no more contented to drink raw milk than to take other food in a raw form. Every year the scientists are showing us reasons why we should study the cookery of milk.

If we put a kettle of milk directly over the fire some of the milk burns on the kettle, and as it heats the little bubbles climb up one above another and the milk boils over. It differs very decidedly from water in that respect, although both are liquids and we might imagine they would behave alike, but when we understand the composition of the two the difference is explained. The milk burns easily because there is more or less sugar about it; it boils over easily because it is a little thicker than water, and the protein matter which is in solution through the milk is of the same nature as the white of an egg, in that it will hold air-bubbles. We have learned by experience, without stopping to reason out the matter, that it is best to heat milk over water. If we put milk in a pail and set the pail in a pan of water, or put it in a pan and set the pan directly over a kittle, we can heat the milk and it will not boil over.

That brings us directly to the point of the cookery of many of the puddings and custards where milk is the principal ingredient. They are much better when cooked over boiling water. The reason that we dislike to have milk burn on the kettle is that such a disagreeable flavor is the result. There is so much water about the milk that it readily dissolves these substances which are changed,—burned or scorched,—and we get that scorched flavor throughout the milk. One of the greatest dangers in the use of milk comes from the ease with which it dissolves substances with which it is brought in contact. For example,—if the milk is put in a pail or pan that is not sweet and clean, we know it very soon by the spoiling of the milk; and so if there is any dirt allowed to get into the milk in the process of milking or in the care of the milk, we get the disagreeable flavor from that. When we stop to think how tiny a bit of nutmeg or other spice it takes to flavor a pudding or custard, we cannot wonder that a small amount of dirt will give a disagreeable flavor to milk or any like substance.

One of the very first things to consider in dealing with milk is the need of absolute cleanliness in everything that is connected with it.

In the days when the majority of the people lived in the country, when every family kept its own cow, and knew exactly the health, condition and food of that cow, there was comparatively little danger from disease coming directly through the milk. But now that so large a proportion of our people are in cities, and when they are so far distant from the source of the food supplies, there is a great danger of disease coming through this medium. The comparison has often been made, in estimating the milk supply, to a large river which is poured daily into our cities from the surrounding country. The milk often comes into one or more central storehouses, from which it is given out again to the milkmen who deliver it to their customers. Now the milk that may be all right from one source, if mixed in that way with milk from another source which is not quite right, quickly partakes of the evil character of the other; so that the supply of milk can easily be contaminated in this way.

I do not believe in being foolishly alarmed about the germs that may be brought to us from milk and other sources, but certainly it is well in this connection to think about them. There have been many cases on record and probably every year others will be brought forward, showing clearly that disease has been brought through milk; and this may be accounted for in two ways,—one, the reason that I have already alluded to, that milk, being in liquid form, very quickly dissolves any substances with which it is brought in contact; and the other, that these germs work so readily in a liquid medium, and particularly in one that is as rich in nourishing substances as milk; thus milk is liable to be a source of more evils than concentrated foods like cheese and butter.

We may have the milk in a pure condition when it leaves the dairy and yet, by the long journey which it has to take before it is delivered in the cities, there is a great opportunity for any dangerous germs to increase rapidly, and the older the milk, of course the greater the danger in that direction. Now cooking milk will destroy these germs; it is not always sufficient simply to heat it once; it has been proven that it is much more satisfactory to heat milk to a given temperature to-day, and again to-morrow, and perhaps the third day. That gives the immature bacteria time to develop, and they are not so easily killed in their imperfect state as they are a little further on.

But this is too large a subject for us to go into here. I only want to show some reason for the cooking of milk from this standpoint. It is easy to see why the various forms of prepared milk are coming into favor in cities. There are many forms: the condensed milk in which a large quantity of sugar is used; the partially condensed milk, the evaporated milk or cream in which no sugar is used, and other evaporated or partially evaporated forms of milk which readily keep for a week though not canned. One special form that I have in mind has been prepared in New York state; it is sterilized and evaporated, and is then brought to Boston and is sold at the New England Kitchen. It has proved helpful to the poor people, who find that it will keep at least a week, and may be diluted as needed; and a great many babies have been kept in a good condition by the use of this preparation, instead of suffering with the diseases which many babies have when fed on the milk supply of the city. Then there is another form which is perhaps newer than the others mentioned and that is known as "modified milk," and is rapidly gaining ground. The milk is gathered very carefully from selected herds, the milking is done in the cleanest possible manner so that there will be no foreign substances in the milk, and it is brought into a laboratory in Boston and the cream separated from the milk. Then prescriptions are made up for babies of different ages so that the milk would be almost exactly like the mother's milk. As the proper percentage of fat for babies of different ages is known, the cream is used in this proportion. To this milk is added sugar, distilled water, and a small amount of lime water, in such proportions as might be ordered by a doctor. The result has been very satisfactory in the case of young children and babies. In one family in the suburbs of Boston, the baby had been carefully brought up on the milk of a cow of which the family had taken great care; but the child was sick, and the doctor put her upon this modified milk, and the result was so satisfactory that the father said: "I would rather pay the fifty cents a day for the modified milk than to run the risk of going back to the milk of the cow." This modified milk is usually put up in bottles just sufficient for one feeding for the baby, and is in such shape that it will easily keep for a number of hours. There are other forms of milk, but it is hardly in our province to speak of them at this time. We can see that there has been a great change in this matter, and that milk in these condensed forms has certain advantages. Milk is more easily transported in this way, and is very convenient for people going on long expeditions. Milk must be pure in order to be prepared in these ways, and there can be few of the dangerous substances left,—they are dead at all events. So that the condensed milk, and these prepared milks, evidently have a place and could not be supplanted easily in the household at the present time.

It is my purpose to show by simple experiments a few of the processes which are closely connected with the cookery of milk; and one of the dishes will be a rennet custard suitable for an invalid, another will be the common milk sauce, which we find so acceptable to serve with many of our vegetables, with bread in the form of toast, with salt fish, and a variety of other things, the milk giving additional nourishment to these dishes. I shall also prepare a soup of which milk is the basis, used much in the same way as we should use soup stock; and then prepare one or two dishes using cheese.

In the first dish I shall use a prepared rennet. There are several different preparations of rennet which are used in the household for the manufacture of certain puddings. There is a likeness between the custard made by simply stirring the prepared rennet into the milk and the custard made with eggs; although the effect is not exactly the same, and strictly speaking it is hardly proper to call this dish a custard. I have here a pint of milk, which I shall simply warm. If I should raise this to the boiling point, or near it, the change would not take place as well as though it were simply warm; the rennet will not work as quickly if the milk is scalded. I think the reason of that is evident: if the milk is entirely scalded the rennet will not have the help of some of the bacteria which may be useful in the change which is accomplished here.

For this I shall use a teaspoonful of the rennet, a tablespoonful of sugar and a little flavoring. Just as soon as the milk is warm I shall pour it over this rennet, sugar and flavoring, and then leave it to stand until it is cold. Then it will be like blanc-mange, or of the same texture as a baked custard. This might be varied endlessly; we might prepare a chocolate-flavored pudding, or we might put with it any sort of fruit. This is known by a great many different names,—junket, rennet custard, slip, etc., but the process is the same whatever we call it. In the preparation of this dish we have an opportunity to see the separation of the curd of the milk, or the change which takes place in the milk by the addition of rennet in cheese making. If we should let this stand in a warm place for several hours, we should find that the curd would entirely separate from the whey; this whey is a desirable drink in many cases of sickness, because it contains mineral substances and a great deal of the sugar of the milk. That is the part that is lost in cheese making with the water. The junket is a very delicate dessert to serve with any sort of fruit, or with whipped cream, which increases the richness of the dish. After leaving it a little longer perhaps I shall be able to strain off the whey and show you the separation of the curd.

The natural separation of the fat from the milk, the rising of the cream, is so common a process that it need hardly be touched upon at all. We know the tendency of fat to rise to the top of a dish of gravy or soup, or anything of that sort, and the process is similar in the case of the cream.

The milk is now warm, and we will finish the preparation of the junket and leave it to cool. In making blanc-mange, in which milk is the basis, we have a variety of substances which may be used to stiffen the milk. We may use gelatine, corn starch or the Irish moss; and each one of these requires a little different treatment, because the composition is different. The gelatine needs simply to dissolve and mix with the milk; corn starch must be thoroughly cooked, and we must put the corn starch and milk together in such a fashion that there shall be no objectionable lumps, and allow it to cook until there will be no unpleasant taste, as is often the case when we use half-cooked starch in such dishes.

We might also consider the different custard puddings where eggs are combined with milk. The composition of eggs is not so very different from that of milk. They both contain fat, protein matter, mineral matter and water; but the proportion of these parts is quite different. There is no starch in either milk or eggs, and when we want to put these two together to make a pudding which shall be a substantial part of the meal, we do well to add some starch; therefore in many of our recipes we combine bread crumbs or rice with eggs and milk, and thus have a great variety of dishes in which the principle of cooking will be much the same.

The next dish I prepare will be some salt fish with a cream sauce, because the cream sauce will give us an illustration of another use of milk. Cream is not always obtainable, and we have come to give this name to a thickened milk sauce.

The salt fish which I am to use tonight is the fibred or shedded cod fish, which is very fine indeed and quickly softens. It is hardly necessary to soak it at all; I have simply put it in a strainer and poured some water over to wash off a little of the salt. The sauce may be regarded as a type of the majority of the sauces which we have to use in cooking. I shall take one tablespoonful of butter, melt it in a saucepan and add a tablespoonful of flour, and as soon as these are satisfactorily combined, I shall add to them a cupful of milk. The object of putting the butter and flour together in this way is that the fat will absorb and retain rather more heat than milk or water would, and so the flour is more thoroughly cooked in a short time than it would be if we mixed it up with a little cold milk and stirred it into the rest of the milk. The butter and flour do not lump,—I have a smooth paste; if I should keep on cooking them long enough the butter and flour would brown, and I should have a brown sauce. I take them away from the stove for a moment in order to stop the bubbling, so that when the milk is added it will go in a little more smoothly. It may be added hot or cold. If cold it must be stirred until it gets hot, which takes a little longer.

The French cooks tell us of two mother sauces,—the white sauce and the brown sauce. These, with different seasonings and different kinds of liquid, stock, milk or cream, give us a great variety of sauces, and these add very much to the acceptableness of many of our foods. This cream sauce is an especial favorite because it can be prepared so quickly and easily.

If we wanted to make our fish still more attractive and nourishing we should do well to add to it some eggs. At this season of the year it is desirable to make eggs go as far as possible, and a single egg, if used in the right way, will make a good deal of show over a dish of salt fish. The egg should be hard boiled and the white cut in rings and the yolk rubbed through a strainer. It gives a very pretty effect and tastes as well as it looks.

We may serve this cream sauce with boiled cauliflower, for example. In the cauliflower we have a water and some good flavors, but not a large amount of nutriment; but adding a sauce like this increases the nourishment of the dish decidedly. So in the case of other vegetables; and many people like vegetables with the addition of cream sauce who did not care for them in their ordinary form. I remember finding in some of my public school classes that the children objected to tasting of vegetables. Perhaps they had not been accustomed to them, or had had them cooked all alike; but when they were covered up with this white sauce they would eat them. If we make food attractive in appearance it will be eaten when it would not otherwise. This is a very nice way in which to warm over food which has already been served. Cold food warmed in this cream sauce is often more appetizing than in its cold condition. I shall add a little salt and pepper,—a very small amount of salt, because our fish will probably season it sufficiently. Of course the salt fish should be well freshened for this purpose. Not only salt fish, but fresh fish is good prepared in this way. If we have a plate of baked fish left, we may pick it over carefully, free it from skin and bones, and warm it over in a sauce like this. If the breakfast is ready for the people and the people are not ready for it, the very best way to keep such a dish as this hot is to put it over boiling water. If we leave it on the stove and when it gets scorched scrape it up carelessly, it has lost a great deal of its attractive appearance and will not taste so good; but we can keep it hot in very good shape over boiling water.

With the soup which I am to make, I shall use a similar process. It will have for its basis a can of corn. In just the same way I might use a pint of almost any cooked vegetable, potato, cauliflower, lima beans, etc. Again, I shall take a tablespoonful of butter, and this time, too, put in a tablespoonful of flour. I shall cook in the butter a small onion cut in fine pieces. Another way to get the onion flavor would be to squeeze in the juice by pressing the cut surface against a grater; but this onion is too small, so we will use the whole of it, cutting it very fine. This is the only thing I have to cook except the flour. The corn is cooked and the milk only needs heating. The flour will have to be cooked, but the onion will want to be cooked longer, so I put it in the hot butter, just as I put the flour a few moments ago, and let it cook until it is tender. We are getting several little points in regard to the cooking of butter, and perhaps it will be best for us to consider this more fully. In very hot countries it is often found desirable to keep butter by melting it and pouring off the oily surface from the curdy portion. In heating butter we often find a white froth rising to the surface, and that is largely proteid matter. If we are so unfortunate as to have any butter which is not keeping well, as that very, very disagreeable article sometimes known as cooking butter, often our best way to do, is to melt it and skim it very carefully, and remove just as much as possible of the buttermilk which spoils the butter. But I far prefer never to have any cooking butter; I would rather use clarified beef fat, a sweet, pure fat, which is cheaper than butter and equally useful in certain directions. I consider it far superior to cooking butter.

As this onion cooks we see a great many bubbles rising; the water coming out of the onion is of course lowering the temperature somewhat, and as long as that water keeps coming out there is no danger of the onion burning; but after it has shriveled a little, both that and the butter are liable to burn. To this I shall add a tablespoonful of flour, and gradually pour in a pint of milk, making a thin sauce. I am now using a pint of milk, but I may add more. I have not investigated to see whether the corn is very juicy or solid; there is quite a difference in that respect. It is a good plan to chop the corn fine, if we want a smoother soup. For seasoning a soup like this, in addition to the onion we may use salt and pepper, and of course other seasonings as we like. The soup may also be thick or thin, as I might readily add to this another pint of milk, in which case of course I should need a little more seasoning. Many people do not realize how good such a soup as this is, and how quickly and easily it is prepared, and, in cold weather especially, it is more satisfying than cold meats and bread and butter.

This soup is excellent for the reason that hot milk is one of the best forms in which to take the milk, as no additional effort on the part of the stomach is required to warm it before it is digested. We heard something of that in a previous lecture in relation to giving cows cold water; and many times we take cold food into our stomachs when warm food would be better. A soup like this is a nourishing and acceptable food occasionally, and if we want it to be the main portion of the meal we should do well to leave it quite solid. We seem to like a contrast in foods and serve liquid soups with crisp crackers, and one of the nicest things to serve with this soup would be bits of bread, cut in small morsels and browned in the oven; or we may cut open common crackers and spread with butter and put into the oven until they are a delicate golden brown.

There are a number of other points which might be brought out in the general cookery of milk, in such dishes as bread, for example;

we find a great difference of opinion with regard to the making of bread; some housekeepers always make their bread with milk, and others with water; others prefer to mix milk and water, using part of each. All of these ways are good, and I would not undertake to say that any one was better than the others; it is a matter of convenience and individual taste. Those points do not vary the general action of the yeast, the general process of bread-making is the same. I am sure that all housekeepers will agree with me that where we have made bread with milk, we have had a different texture from what we have in making water bread, the milk containing sugar and albuminous matter, which is, on some accounts, an advantage.

The next dish which I shall prepare will have to do with cheese; and when we come to consider cheese, we have really the most substantial form of condensed or concentrated milk that we have to deal with at all; and that is the principal reason that many people find cheese indigestible. We have often heard people say that they cannot eat cheese,—it does not agree with them, and this is largely because it is such a concentrated form of food.

Analyses of cheese of course differ according to whether the cheese is made of whole milk, skimmed milk or cream; but an analysis of the average cheese would show us about an equal division of fat, casein or proteid matter, and water. We might for convenience call it about 33⅓ per cent of each of those substances.

That is very solid food because the majority of our foods contain a much larger proportion of water. In meats we would find about twice as much water as we would in cheese; we can readily see that from the juice of the meats. So the principal objection to the use of cheese as a food is its concentrated form. Furthermore, although formerly we did not have that idea, people who have studied this question have come to the conclusion that cheese if properly cooked is more digestible than if uncooked. If we take this concentrated food, which already has so little water in it, and toast it, of course it will be still harder of digestion; but if we take this cheese and dissolve it and mix it with milk and so spread it out and add more liquid to it, we are getting a food that is more digestible than it was in its original state.

As far as I know there has been but one book published which has taken up the cookery of cheese in any scientific way, and that is the *The Chemistry of Cookery*, which was written by W. M. Williams. He devotes one chapter to the cookery of cheese, and has made a great variety of experiments with it; and his experiments are worth a great deal to us when cooking cheese. I cannot begin to repeat them to you to-night, but would refer you to that book as having some interesting reading along this line.

When we come to the cooking of cheese we shall see that again it is well for us to cook over water. To-night I shall prepare a dish, where the richness of cheese is reduced by using some bread. This dish is called by a great many different names; one of the best names, perhaps, is cheese fondu. I shall use a cupful of bread crumbs, a cupful of milk and a cupful of cheese, a tablespoonful of butter, one egg or two yolks, and then it is to be seasoned with salt, pepper, and mustard if liked. It is something of the nature of welsh rare bit, though welsh rare bit as ordinarily made would be cheese, eggs, a little milk, and usually a large amount of seasoning, so that the average taste does not accept it at first, it is rather an acquired taste; but a moderate amount of seasoning of mustard and cayenne pepper is not objectionable.

You can see that in this dish we have not only the fat in the cheese, milk and butter, but we have nitrogenous matter or proteid matter in the cheese, milk and egg, and we have water in the milk; then by adding bread crumbs we have some starch. This is a concentrated, nourishing dish, and occasionally might well take the place of meat dishes. It is not out of place perhaps for us to compare the relative amount of nourishment in cheese and meat. A pound of cheese, compared with a pound of average meat, is certainly very free from waste. There is only a little rind to be trimmed off from the cheese, and in the meat there is usually some bone, gristle and skin. Then in the meat there is a larger proportion of water than in the cheese, and we may be quite safe in saying that the average cheese costs hardly as much as the average meat. That is, cheese at fourteen, fifteen or sixteen cents a pound is going to give us a great deal more for the money than a pound of meat at the same price.

Into this stewpan I shall put a tablespoonful of butter first, simply because it will rub over the pan so nicely and the other ingredients will be less likely to stick to the pan. A great point in all these things is to think about the ease of washing dishes; sometimes I think that is more than half the battle in housework; and it is a little saving to put the butter in first. The cheese which I have to use to-night is very rich, so rich that it would be almost impossible for me to grate it. Cheese that is slightly dry may be grated easily, but this I shall cut in little thin shavings. Ordinarily a half pound of cheese will be two cupfuls; we want about one quarter of a pound, or a cupful, of the cheese. There are a great many forms of cheese,—too many to enumerate here. I have with me the grated Parmesan cheese, which can be used for many different dishes, and is extremely convenient because it can be kept so long, although it is rather expensive. We may in our homes save all the little bits of cheese which get dry and are sometimes thrown away, and grate them and keep them in almost the same way.

The use of cheese with macaroni is not so general in New England as it should be. It is a very good food, and if nicely prepared a palatable as well as nutritious food.

This cupful of cheese which is cut in little strips or shavings, I shall put into the stewpan with the bread and milk, for a few moments; no harm will come to it while we are preparing the egg. As I suggested, we might use two yolks instead of a whole egg; that gives a richer color, and perhaps a rather more creamy consistency, and when we can turn the white of the eggs to a good account in another direction it is a very good thing to do. I beat the egg slightly, and so have taken a fork for that purpose. In the book to which I have referred the addition of a small quantity of bi-carbonate of potash is recommended, because in that way the casein is rendered a little more soluble, and there is a partial restoration of the potash salts, which are lost in the process of cheese-making. We will use about one-eight of a teaspoonful of soda to aid in softening the cheese. The mustard is so liable to be lumpy that I sift it, with the soda and the pepper, and also the salt, into the egg. When the cheese begins to melt it becomes very stringy, and I have often had people say, "What is the matter with it? It is not right." But if we wait a few moments the stringiness is overcome by the further action of the heat. If we should attempt to make this dish with a dry cheese, or one that was lacking in fat, it would need very great care in stirring and mixing in order to hold the different parts well together. If we should make a cheese dish of that description we might find that we had a very different result, showing that the curd had separated thoroughly from the milk, and would be a hard substance like ivory in texture; that very seldom happens, if one is careful and does not use a cheese which is too dry. The cheese, milk and bread crumbs are well blended and it is beginning to cook. I shall add the egg and seasoning, stir it for a moment or two, and then it will be ready to serve. We have put into this cheese fondu, one tablespoonful of butter, one cup of bread crumbs, one cup of milk, one cup of cheese, one egg, and for seasoning one-half a teaspoonful each of salt and mustard and a very few grains of cayenne pepper; also one-eighth of a teaspoonful of soda.

This is sometimes called a cheese omelet, and yet an omelet is a very different thing. I think I shall have time to show the preparation of an omelet.

The omelet gives us another form of milk and eggs to be used together. I shall separate the yolks from the whites of two eggs and add two tablespoonfuls of milk, a tablespoonful of the grated cheese, and a little salt and pepper. Then I shall cook it like the ordinary omelet. The yolks and whites of the eggs are not always separated, but it makes a more attractive omelet to separate them; we do not get any more nutriment,—simply a little more show.

Having beaten the whites of the eggs for my omelet until stiff, I shall drop in the yolks, add the seasoning, and after beating a moment add the milk and the cheese, and the whole will be ready to cook. If we should turn the omelet immediately on to a cold platter the sudden change would make it shrink, or fall. But if the platter is warm we may venture to turn it out while it is still soft on the upper side. This is a very nourishing dish; I suppose it is true that the American people, as a whole, use too many meat foods in proportion to other foods, and so sometimes this cheese dish may be acceptable as a substitute for a meat dish.

I have given very little opportunity so far for questions, and during the last few moments I am sure there will be some questions on points that I have not had time to fully explain.

When we once begin to study cookery in our homes and in schools, in the same patient, slow, careful way in which questions pertaining to dairying and food for animals are being studied by this society, I am sure that we shall be a great deal more free from disease, and be able to do much better work than we can do at present.

I think the special reason that housework, cooking and all the kindred arts have fallen so into disrepute is because there has been no definite money value placed upon them in the home; and so women have naturally gone out of their homes into offices and stores where the value of their services would be recognized.

POTATO FIELD OF ARTHUR WILLEY, LIMESTONE, AROOSTOOK COUNTY, ME.

RATIONAL STABLE MANAGEMENT FOR DAIRY CATTLE.

An Address by JOHN GOULD of Ohio. Delivered at State Dairy Meeting at Farmington.

Mr. Chairman, Ladies and Gentlemen: Thirty years ago "Puck" could have had no greater joke on its first page than the picture of a man giving a lecture with the above title. It would have been the huge joke of the day, because cows then had no stable management, as now understood; and if the picture of the barn of 1894 had been presented, it would have been said, "Not only is this man joking, but he is a lunatic as well; for nobody will ever do so well by the cow as that." This advancement in the care of the cow from the barn that had no care and the cow that had less, to the present well constructed stable with all modern conveniences, is simply an evolution, a demand for better results.

Every time we come in closer contact, closer competition, with some one else, we shrink back from nature and put an artificial condition in its place, and so to-day dairying is almost wholly an artificial condition that has left nature far in the rear. The cow is an artificial product of man's skill in feeding and breeding and the stable is simply an evolution to keep pace with the dairy.

To-day we have thoroughbred cows instead of the brindled cow of long ago that had no breeding that could be called such; barns fitted for these cows, and dairymen to feed and care for them so that nature is assisted at every step.

If you say "But nature never makes any mistakes" then I will show you a wild horse, a brindled cow, an untutored Indian, a Texas steer and a razor-backed hog. These are nature's products,—the results of farming without barns, without regular and well selected rations, leaving the animal to war with the elements and with brute force. We are completing nature by providing better food and better shelter than she is able to provide; also we have come to see that if we want to get a certain result out of the average, we must put in something beside the average, and thus are getting improved breeds. To-day the brindled cow, bred on the hills, has been supplanted by the thoroughbred; the anything and everything of food has been supplanted by balanced rations; the anything and everything of a barn has been supplanted by a barn that will enable us to economize the food of the cow, and make the summer more nearly a year long. But back of this thoroughbred cow, back of this thoroughbred food, back of this thoroughbred barn we must have a thoroughbred dairyman; and he has been evolved out of nature, for I can well remember the time when the cow was sent to the woods for her stable, because nature demanded that she should be made hardy. And so step by step we have advanced until we stand here to-day and talk about "Rational Stable Management for Dairy Cattle."

I think you readily see that the stable, which means protection from storm and cold, uniformity of temperature, and avoidance of extremes of any kind, has been a great factor in bringing about this artificial condition that is now found so necessary, and lies at the foundation of all successful dairying. Now, we are going to concede this afternoon that we have a well bred cow and a good stable. What is the rational treatment that we should give this cow? We have come as dairymen to understand that back of the treatment, back of the stable, is the matter of heredity. The food of the cow has been changed, the care changed and the breeding changed, until to-day when we go into a first class dairyman's barn we see a cow that shares in common with the cow of 1850 almost nothing except the maternal function. Now, when do we begin to stable this cow? Ten years at least before she is born! We do not make cows now on demand; the brindled cow by asking does not turn into a Jersey. We must commence back where we shall get prenatal influences. We are developing a cow now, in one sense, before she is born; giving nature hints and directions. Did you ever think why the thoroughbred cow is better than the cow from Texas? Why should not the Texas cow give milk 10 months and make 300 lbs. of butter in a year? Why should she be so long legged and long horned? She has been left to nature and what we want is an artificial creation, and so our stabling of the cow must begin at least ten years before she is born. I would have the calf well born. The idea of parental influences is becoming stronger with the best breeders, and if the mother of the calf is well fed, well stabled and well cared for, the influences which surround her will be strongly inherent in the future calf. I no longer believe that nature does everything and all we have to do is to put it to our use. I believe that we must care for our cattle intelligently.

We have to-day what we know is an artificial dairy cow; and when we have reached this artificial condition we must not turn over to nature our best feeding, our best breeding and our best care; because while we have been trying for several generations to get this product it will take but one generation to upset it all. And so we must lay the foundation well for our stable management.

Now what shall we do with the calf? We want a dairy cow, and the natural way is to turn the calf the tenth day of May into the back pasture and keep her there until fall, feed her on hay and corn stalks, and let her stand behind the corn stalks the first winter to give her constitutional vigor! The next year she will come into the dairy a little, weak, undeveloped cow. I would have this calf well raised. The first influences of her life should be towards the development of stable life and the dairy tendency. So I commence to feed this little calf intelligently and well from the start. The calf is the cow's baby, and she provides warm, sweet milk for it; but we try to feed it on cold, sour milk, and because it refuses to drink, hold its head in the pail and say, "Drink sour milk or drown." Did you ever know a man that did that? Every man of you here has done it! But if you had asked your wives what babies wanted they would have said, "Warm, sweet milk."

Feed the calf warm, sweet milk in which there is a little cooked oilmeal; later on add oatmeal, and when it begins to chew its cud give it whole oats and some fine hay. Less than a week ago I saw some calves four weeks old eating hay. Just think of it! Putting the hard, solid stalks into the little calf's stomach! What would the little calf do with it? The calf does not have a hay stomach until it is six or eight weeks old, but simply a milk stomach, and should not be fed solid food until it can digest it. I have never seen anything that equals oats for the first solid food.

Please feed the little calf three times a day. Little babies like to eat a great many times a day, and little calves ought to eat as many times as little babies. But we say "Twice a day is enough;" twice a day it is and we have a chorus from the barn which finally gets so long, and loud and persistent that we go to the back end of the barn and let our wives fight it out.

We want to have a calf that grows all the time, and develops quite as much in the winter as in the summer; and for this purpose we should feed it to produce nerve force, bone and sinew. Let us feed this calf along the line of clover hay, and keep it in the barn the first summer, whether it is in Maine or Ohio. I would rather feed the calf than a horde of hungry cattle flies and horse flies;

and that poor little calf out under the apple tree is getting the whole business. Keep it up, and by and by add a little bran to its feed, and wheaten meal, and let the corn meal go. Corn meal has very little place in the diet of a calf. In the State of Maine we are feeding for milk and not for beef, and should not give the calf foods that will produce fat. I want to keep this calf where I can look after it, and get it so that it will like me. If we teach our calves to be fond of us, by and by we shall get a return in a way that we can get more than compound interest out of.

The heifer should come into the dairy at two years old, and I want her to have the same barn education that my dairy cows have. If she comes in in the fall I want her to run with my cows for the last three or four months before she comes in. If she comes in, in the spring I want her stabled with my cows, and then when she comes into the dairy she knows what it is to be handled. I do not believe in too much tomfoolery about her, but I want to have her handled. I should teach her to be tied up regularly, and sometimes make believe milk her. Then she will come into the dairy with dairy habits and you will not have the work of breaking her. Some of you can remember that process. It surpassed anything that Barnum ever had. I would feed her liberally of bran for that developing life she is having to supply.

I want this heifer stabled every day in the year after she comes into the dairy. Let us make this stable life a continuous habit, so that we shall have uniform milking and handling. Another thing I would mention in this connection :—I would not have this heifer come back into the dairy just as soon as I could get her there ; I want an interval of three or four months. If the natural period be to come back into the dairy in a year, then make it fifteen or sixteen months.

Now we have stabled this heifer, and have given her foods that go to make muscle and nerve and tissue and are productive of milk,—and let me say here that you should never fatten her ; she should be fed so that the food will go to the production of milk and not on to her back,—then we want to give her the milking habit the first year. Did you ever think of the fact that wild cattle dry off at the end of eight or ten weeks ? If our cow gives milk a year it is an artificial condition, that has induced her by better care and better feed to prolong the period of lactation. Frequently at the end of three months the heifer, however well bred and well cared for will suddenly take a notion to dry off ; and if you let the milk go down at that time she will do the same thing the next year. Six months the first year means six months the second year, so that when she begins to dry off is the time to put in extra feed. I believe in feeding well up to this point, but should then give her additional feed to carry her over and induce her to give milk eight, ten or twelve months; and the next year she will do the same, and we shall thus get the cow into the habit of giving milk longer.

I would like the cow to come in in the fall for this reason; nature is a little uneven in its supplies.—it is dry weather and wet weather, storm and sunshine, a great many flies and a few flies. If she comes in in the fall and we feed her a uniform ration and keep her in a uniform condition through the winter, when she goes out to grass in the spring, then nature comes in with the succulent foods and the heifer gives milk two months longer than she would if she came in in the spring; and you have gained that two months without its costing you anything.

Now, what is the stable for? Why do we stable the cow? Please think of that a few moments. The purpose of the stable is to economize food and to protect the cows from the storm. We undertake to make summer on the farm in the winter. That is why we build the stable. And how shall we build it? The stable of the future will be built differently from the stable of the past. The stable should not be damp and dark but should be well lighted and kept as warm as possible. While the stable should have ventilation I think we do not need to give our cows on the average any more fresh air than they are getting. Fresh air means a colder stable, and a colder stable means less milk, and more food required to serve as fuel. We want a rational barn, one with just as near the summer conditions as we can get it. But you say to me "We cannot give our cows summer conditions in Maine because they must be made hardy." Did you ever feel in the summer when the thermometer was at ninety degrees that you must put your cows in cold storage for a time? But when it comes to the matter of economy of food we suddenly ask our cows to be hardy, and finish it up with a dose of ice water.

We want our stables to be dry and warm, and we want our cows to be in them twenty-four hours and fifteen minutes every day from the first day of November to the first day of May. But you say "Our cows will all die." Have you ever known any cows to die that were kept in a warm stable? My own practice is to put my cows into the barn in the fall and keep them at a temperature of fifty degrees, in a warm, light stable all winter; and I have stopped selling cow hides, but instead have used the cows to return my grain, hay and ensilage with good interest.

That is the intelligent way, and any man in Maine or Ohio who is putting the food which it has cost him so much to earn into an unproductive channel and can show nothing for it next spring, had better have shut up shop last fall, and gone to live with his wife's father through the winter. Did you ever think what became of the food that you fed to a two-year-old colt that did not weigh any more in the spring than in the previous fall; or to a dairy cow that did not give any milk in the winter; or to a pig that jumped through the same sized hole in April that he did in November? That is assisting nature the other way.

But if you had fed intelligently, to the cow that gave milk through the winter, the colt that gained in weight and the pig that was butchered in the winter, you would have been able to say, "I know where the food has gone that I raised last summer." In order to gain the best results from our feed we must have the best kind of a stable. We want a stable that will not freeze, and this can be obtained by the use of pine boards and tarred paper, and by having the floor let down onto the ground, to prevent the cold air from coming in from the outside. The stable should have a great deal of light and sunlight. We turn cows out of the stable more on account of the beneficial effects of sunshine than any other demand; so if the cows are to have continuous stabling there must be windows in the stable, and sunshine. A dark stable is a damp stable, and a stable pervaded with foul odors. We should first make the stable light and then use a great deal of whitewash. A whitewashed stable looks a great deal more cheerful. The cow has more humanity than we give her credit for; she likes her home if it is made pleasant for her. She wants to be in her home; no other place is so attractive to her as a good home. We want the stall made light and free from bad smells. To remove the odors we should use a large quantity of absorbents. Let us have a water tight gutter into which absorbents are placed every day as soon as the stables are cleaned. And what shall we use for absorbents? We cannot dig muck and pick up leaves because it takes time. But we can get road dust in summer, and there is always horse manure at hand. When we clean the stables in the morning let us put from to two four quarts of road dust into the gutter and then fill it up with horse manure, and we have a good deodorizer. Now clean out your stable twice a day, and you have a clean stable, a warm stable, and a sweet smelling stable.

I am very glad to know that one of the evils in the West, the rigid stanchion, has very little place in Maine. If you know of any man who still uses it, let the Women's Christian Temperance Union go and plead with him. The stanchion is going very fast, and the chain or rope coming in very fast. You say "What is your objection to the stanchion?" My objection is what your objection would be if you were to stand on all fours with your head in the stocks an hour or two. Away back in the early history of Massachusetts, when they were hanging Quakers for pleasure and amusement, an old Quaker down in Providence was sentenced to be hung, and sent up to Boston. One of my great, great grandfathers (I guess that is back far enough) went up with him to sympathize with him, and was ordered to be taken back and given twenty lashes and put in the stocks; and the Goulds have been down on stanchions ever since. Let us tie our cows with a halter or a swinging stanchion, allowing them all the freedom possible. And if there are to be winter calves have a box stall right in the stable so that the cow will not be forced to go to some other part of the barn.

Now, in regard to the food for these cows: If we want our cows to give milk, and I believe the Maine dairyman always milks in the winter, I should say in the first place, give your cows food calculated to harmonize with their surroundings. The cows food in hot weather is succulent food, green grass, corn stalks and clover.

If you attempt to give them summer in the barn why not give them summer food, so that they will have a uniform condition throughout the year?

I get this joke on Prof. Jordan once in a while;—We want for our cows a balanced ration, so we write up o Prof. Jordan and ask him what a balanced ration is The reply he sends us is "A balanced ration is one pound of albuminoids or protein, and five pounds carbo-hydrates and free ether extract." Well we have that ration right handy, havn't we? We write back and ask him to please translate this for us and we find that he means to say one pound of wheaten bran and five pounds of cornfodder, multiplied by as many times one as the cow will eat it, is a balanced ration. Why didn't he say so at first? Why did he give us those long names? Well, that is what they pay him $2,000 a year down there for.

We want nice, clean, bright ensilage, fresh from the silo, and a little fine hay, and we have all the starch we want; and now we want some protein. (I wish I could use some other word, but that is a good word and perhaps we farmers might as well get used to it.) And what is protein? A food that contains little starch in proportion to its bulk, as peas, beans, oats, millet, buckwheat, linseed and cotton seed meal. And the question comes up here if we cannot in Maine raise peas, beans and oats, and save the expense of buying cotton seed meal, which is a very little richer food. My own opinion is that we should get the best results from feeding with ensilage, wheaten bran, buckwheat and clover. By bringing these foods intelligently into the life of the dairy cow we have reduced the cost of keeping her.

Whenever we meet with competition we must either cheapen the food that our cattle eat, or economize that food. If we can raise the protein cheaper than we can buy it, then our stable will be the source of more revenue to us.

Perhaps at this point you would like to know how I would take care of my cows. In the first place, as I have said, I would stable them continuously from fall to spring. As soon as we begin to want fires in our houses we want the cows in a warm stable. Tie the cows up early in the fall and do not turn them out for exercise during the winter. We have found out that it costs food and milk to turn the cows out for exercise; and in a well appointed stable with good sanitary conditions I think we shall find that continuous stabling is far the best way.

I should feed the cow all she would eat and eat up clean, twice a day in the winter. But you say "The cow in the pasture left to nature eats all the time." I have never seen a cow eat but three times a day. She eats in the morning until about ten o'clock, and then lies down and chews her cud; at about two o'clock she gets up and has another spell of eating; and after milking she eats about two hours and then lies down for the night. But she is getting easily digested foods, and when you put her in the barn on dry food, nature must have more time to assimilate that food. We found that in feeding our cows all they would eat and eat up clean, twice a day, we got more milk and saved food, because the food that was eaten was more properly digested, and produced more milk. The feeding and milking should be done regularly.

If we feed regularly we can water regularly, and this is one of the essentials in the better keeping of our dairy cows—water when the cow wants it. Did you ever think how much water a cow drinks when she is eating dry food? A cow that is giving you two pails of milk will drink eighty pounds of water, almost as much as she has blood in her veins. And you ask her to warm eighty pounds of water at thirty-four degrees with the blood at ninety-eight degrees! And then you wonder why she is shivering, and say that she is tender. I would water this cow in the barn, and give her a chance to drink as often as she wants to. I think it will cost you less to pipe the water into the barn from a good well or spring on the side hill, than it will to warm ice winter all winter, and use the cow to do it with. I have a large tank in my stable which is kept full from a well near by, and the temperature is not far from that found in the stable. Of course your cow shivers after she has taken eighty pounds of ice cold water; you have sent her one-third of the way to death. If you raise her temperature eight degrees she will die of fever; if you drop it eight degrees she will die of congestion. The pipes and gutters, all the apparatus for piping the water into the barn, costs the magnificent sum of sixty cents per cow. That is less than it costs to turn a cow out in a cold day and stand and see her drink. And in this way the cow is enabled to drink when she is thirsty, and when she is not thirsty she does not have to drink for fear she will not get any more water until day after to-morrow.

With this uniform care,—uniform rations night and morning, uniform water and uniform temperature,—there is no reason why your cow should not give a uniform amount of milk the year around.

The dairy product is twice as high in the winter as in the summer, and we have turned our winter into the most profitable portion of the year by means of these artificial conditions; and hence our foods have been turned in profitable directions and not into unprofitable channels. This has been brought about by the evolution of the stable; food for the cow and a cow to eat that food, a balanced ration of the mixed foods of the farm, and a cow to eat that ration and turn it into milk; and behind it all a thoroughbred dairyman. This evolution of the stable is an evolution up! up! up! And every time I have raised the level of my dairying I have raised myself correspondingly as a man; and the result is farmers, who are the peers of any people on the face of the earth.

PRESIDENT HARRIS of the State College, Orono.

Ladies and Gentlemen:—Your Chairman was careful when he asked me to speak to you to say that he wanted me to talk only a few moments and I shall try not to disappoint him. There are four college presidents in the State of Maine, and I suppose I am the only one here; and I suppose that the reason why I am here and they are not is that I represent a peculiar Institution. Peculiar in the first place because it is a part of the public school system of the State; and it is greatly to the credit of the farmers of the United States that there exists in Maine to-day a college for the higher education of young men and young women which is a part of the public school system, free, and teaching the various businesses as well as the various professions of life. More than a century ago in the state of Vermont there was a young man, the son of a blacksmith, who had gone into business, although ambitious for an education. His father was one of those hard-headed, common-sense men, who objected to an education for a business man. He thought some how or other it might do for a doctor or a minister or a lawyer to have an education, but the man who was to earn his living by business pursuits must be kept,—not perhaps ignorant, but not too learned. And this boy got no education because there was not in the United States a college that would give him a liberal education and fit him for business. The father was not altogether wrong.

Many a business man has been ruined by the wrong kind of a higher education. But the boy was right also, for there never was a business man of the right kind who was not a better one for having the right kind of an education.

After a while that blacksmith's son came into Congress and became a member of the United States Senate. He introduced a law providing for the gift of an enormous amount of land to each state for the establishment of a college, and I want to lay emphasis upon the word *college*, which should have for its object a liberal education; not a school education, but a liberal education of the industrial or business classes. The law further provided that these colleges should have for their main object, and by their main object was meant their first object, the teaching of the sciences which related to agriculture and the mechanic arts, that is, the manufactures and engineering professions. It further provided that they should not exclude the other sciences and the classics. And this business boy laid the foundation in every state of a college whose charter is the broadest that this country has known; and to-day we are doing for you largely at your expense,—for our institution is supported just as the public schools are,—the best work that our funds will allow. And whether a boy will be a mechanical engineer, or a civil engineer, or an electrical engineer, or whether he prefers to follow chemistry, agricultural science or the practice of agriculture, we are attempting to give him just as good an education both in technical lines and in general lines as can be found anywhere in the United States.

Now, ladies and gentlemen, I was told that the principal reason I was called upon was to give you an opportunity to look at me. I think you have had a sufficient one and I will stop.

PROFESSOR W. H. JORDAN.

Ladies and Gentlemen—I suppose I must say something in order that the object of my coming to the front may be explained. (I would not have you for an instant suppose that I assume Dr. Harris did not say anything.) I was riding on the cars the other day and fell in with a farmer who lives near the home of one of the graduates of the course in agriculture at the State College. The father of this young man is a man who owns a large amount of land and at present is doing a large farming business. His son, who is our graduate, is now at another institution fitting himself to be an experiment station worker. This neighbor of the father said to me: "Mr. Blank was formerly not a very prosperous farmer, he was not considered a successful farmer; but after his son began to come home from the college, and especially since he graduated, for he remained at the college for a time as assistant, there has been a decided improvement in the methods and the success of that man." The neighbors attribute it to the information the boy obtained, and the fact that the father has been wise enough to take the advice of the son. Now this was a rather candid, quiet, cool-headed farmer who said this to me, and, friends, I took it as a compliment not only to the institution but to our graduate and to the good sense of the father. Now I cannot at this time in just a moment review—

and it is not necessary because it was reviewed this morning—the changed conditions in agricultural practice, but I want to declare *this* in terms not as modest as those in which Prof. Gowell spoke this morning, that in the progress of any branch of agriculture in Maine from this day on, the State college and the experiment station expect to be counted as a prominent factor. We do not propose to be left out. Did you ever see a boy on one end of a teeter board and the other end in the air, and that boy getting very much fun out of that? He generally gets another boy on the other end of the teeter board, or perhaps some girl that he likes better than he does the boy. Now if I may use that rough illustration, the State college and the experiment station are on one end of the board, with a fair amount of funds and with a most excellent equipment for the work we are at present doing, but the farmer and the farmers' sons have got to get on the other end or there will not be any fun, there will be no progress that we can take any part in. That, then is what I want to say, that in this work of the State and of the college there must be mutual co-operation. There is, I am very glad to say,—it is a fact that I appreciate most keenly,—so far as the farmers of the State are concerned there is co-operation that is very gratifying to us, but we want in our short course, and in our long courses if you please, the young men of the State that propose to be farmers, that propose to be investigators in science that propose to give their attention to the problems of science either practically or in a scientific way, we want those young men to educate. I was moved while listening to Brother Gowell this morning to think that if I did say anything on this subject I would say something also as to what constitutes preparation for a man's work. I want to ask you a question: Haven't you gotten through with the employment in the case of your valuable animals with the old fashioned horse doctor, the man who does not know a single foundation principle about the application of any medicine?

Has not the time come for the employment of a veterinarian, the man who has begun at the beginning of things in the science of medicine and informed himself from the foundation up? You must answer me in the affirmative. Do you even for a moment think that in the practice of agriculture a man can any more neglect to begin at the foundation of things and build his knowledge from fundamental principles than he can in anything else? We do not expect every farmer's boy in the state to come and take a four years' course, but only a certain class, and so in order that we may give to those who cannot spend that time or that money a chance, we have a six weeks' course. I hear lots of young men say, "I would like to come down but I cannot leave or I cannot spend the time." Six weeks and $25 are but a slight expenditure for attention to the fundamental facts of the calling of a farmer. Are there any farmers here that have sons that like the farm? Are there any fathers that would like to discuss some of these principles? We invite you to our six weeks' course that opens the second Monday in January. We want about fifty for that course.

MR. HARRIS.

Mr. Chairman, Ladies and Gentlemen:—I am quite unexpectedly called to address you this afternoon. I have no address in my mind, but there are some general facts pertaining to butter that may be of interest to each one of us who are connected with the dairying business. In the first place it is very essential to have your goods suit the customer who is to pay for them; and a very important thing is that butter should be made in the form, salted to the taste, colored to the taste, and delivered as frequently as the customers demand. It is almost an impossibility to get a test of butter that is absolutely fair. In order to do so it would be necessary to have the cows all come in in the same week and the butter to be made on the same day, because after a cow has given milk for two or three months the flavor of the butter has deteriorated; and I never have been able to discover butter with a full, rich flavor, unless from a new milch cow.

It is very necessary that the food should be of the proper kind and quantity. There are some customers that have been accustomed all their lives to certain flavors, and if you are always to have them for your customers and never to increase the price and quality of your butter, keep on feeding in the same old way. But if you want to increase the value of your butter so that it will turn you more money, I should say increase the quality and improve the flavor. The flavor is first and foremost, and strange as it may seem to people who are not accustomed to tasting of butter, there are frequently found four or five distinct flavors in the same butter; and if you can find the flavor that suits your customer and have the butter put up in a neat and attractive package, the customer will call for it, and it is surprising to find how many people are wedded to one particular kind of butter. We sell butter in all forms ln the firm which I represent, from little ounce prints, quarter and half pound prints, to ten, fifteen, twenty, thirty and fifty pound tubs, all sizes and all qualities. We have some in round boxes and some in square boxes. Take the customer that is used to handling a square box and you cannot ever suit him with a round box; or the customer that is used to a round box will not be satisfied with a square box. It is very foolish, it seems to me, but that is the state of the case, and therefore we propose to have our customers have the butter come in the form they desire. The man that pays for the butter is the one that I want to please. Of the butter that we have brought before us this afternoon I presume I shall go away reckoned as being a pretty poor judge. One thing I said, "I never claimed to be a good judge of poor butter." It is an unfavorable season of the year to have butter at its best. Most of the cows are stale and a great many are feeding some kinds of foods that deteriorate the quality of the butter and affect the flavor. Of course the standard that I have in my mind is the standard that I have in my business. We have a fine class of customers in the city of Boston and its suburbs. We have customers that extend over a wide range of country. I received a letter last Saturday from parties in St. Louis, Mo., stating that they had been boarders in Bethlehem, N. H., and were very much pleased with the butter. The proprietor told them it was obtained from our firm, and they wished us to send them a tub and said if it was received in good condition they should want a tub every ten days. The butter represented here to-day is of fair quality. Some of it is decidedly poor, and some of it is very good. There is but little butter that comes very close to perfection, and the highest score that we have found here I think has been ninety-five and ninety-six; and some has been considerably lower. I do not know but it is a creditable exhibit in this State at this season of the year. I think Maine has not kept quite up in butter making with some of the other states. Ten years ago New Hampshire butter was not wanted, but now she is making as good butter as any state in the Union. At the World's Fair Nebraska and New Hampshire, strange to say, stood at the head of the procession; not saying but they make as good butter in Vermont, but the butter sent to the Exposition did not rank as high.

The knowledge of the standard used at the World's Fair has been so wide spread that I think it would be a wise thing to adopt it as a national standard.

At the Fair there were exhibits from thirteen states and from provinces of Canada. According to the standard adopted there, where butter scores ninety, it represents ordinary good commercial value. Anything above that is considerably above the average. Anything below would go for a few cents less in price.

Ques. I would like to ask what are the right proportions of oats, peas, bran and linseed meal to feed with clover hay, and some June hay, to give a good flavor to the butter.

Ans. I am not able to tell you the rations to give a cow, as I never made a pound of butter in my life, and have seen but a few pounds made. But I naturally associate flavors that are objectionable or favorable with the food that is given to the cows. I think very great care should be taken in the use of cotton-seed or linseed meal.

Ques. In the standard of 90 what part of that is flavor?

Ans. The flavor should be not below 38,—38 or 39.

Ques. What are the elements that determine the flavor, anything except the opinion of the judge?

Ans. I can only answer for myself; I have to use my own judgment.

Ques. Is there not a flavor which would be recognized by all expert judges as the correct flavor, and upon which they would all agree?

Ans. I have no doubt of it.

Ques. Do you consider that peas and beans affect the flavor of butter unfavorably?

Ans. I do not know that I am qualified to answer that question, as I do not know that I have had any experience in testing butter made from cows that had been fed with such rations.

Ques. Wherein has the butter which you have examined to-day failed mostly?

Ans. In the flavor.

Ques. I would like to ask Mr. Gould to give us a definition of the term "stale milk."

Mr. Gould—A cow that has been giving milk six or seven months is a stale cow, and the milk would be stale milk. We call the cow a "stripper" in the West. Some would call her a farrow cow.

Ques. When you find butter that is a little off in flavor and do not know any cause do you call it stale cows?

Mr. HARRIS—I am not always able to tell the cause; I guess at it. I think in a number of cases the marks on the score cards are stale cows or long kept cream.

Ques. I noticed on the cards that the standard for color is for June made butter. Does not the standard for taste come largely from that also?

Ans. No, Sir. We do not go by the June flavor. I have endeavored to be very lenient in judging color, as not two samples of butter have the exact shade of color any more than two leaves on a tree are exactly alike. I have used a great deal of margin in marking the color. Some I have marked off a little with great regret, because it would not be objectionable in the market to-day.

Ques. Do you think the artificial coloring has any effect on the flavor?

Ans. When proper kinds are used in the proper quantities it does not affect the quality at all.

Ques. I would like to ask if the breed of the cow and the cow herself do not have as much to do with the flavor of the butter as the length of her period of lactation?

Mr. GOULD—No. The old brindled cow if as well fed makes just as good butter as the thoroughbred. Flavor is an artificial creation. Butter fat as it comes from the cow is absolutely without flavor.

Ques. Do peas and beans affect the flavor of butter?

Ans. You cannot feed flavor into butter, but you can, (to use a rough Western expression) "feed a stink into it awful nice." Anything that the cow will thoroughly digest,—that does not contain essential oils that are indigestible, provided you do not feed her so much that she cannot digest it, will not affect the flavor of the butter. Cabbage and onions contain essential oils and on that account cannot be digested, and the milk gets its share.

Ques. How about quality?

Ans. You can granulate butter and make a coarse quality of it, or you can make wax of it. What I call quality is whether it has that granular consistency,—whether it is worked just enough to get out the water, or whether it is put on the butter worker and worked into salve.

Ques. How about turnips?

Ans. I never found turnips such an awfully bad feed as some people think. If you turn cows into the clover and give them more clover than they can assimilate you are going to get the flavor in the butter. But if the cow eats a reasonable amount of it and digests it you do not hear any more about it. If a cow is given a reasonable amount of turnips I have never known any trouble; but if you feed her two bushels you will turn up your nose at the result.

Ques. I noticed in the *Dairyman* that this matter has been discussed somewhat and I find that some of the writers claim that a great deal of the unpleasant odor of turnips and cabbage goes through the breath, and consequently it makes a difference whether these improper foods are fed just before the cow is milked or just after she is milked. What is your opinion in regard to that?

Ans. I think it would make a little difference on some of these strong foods. The longer time that the animal has to digest and assimilate the food and purify the blood out of which this milk is made, the chances are, the better the milk will be. Feed your cows just before milking and you are liable to get a taste of those obnoxious foods. That is a very fine technical and physiological question and I do not care to discuss it very much. There is more danger from having strong flavored foods and milk sitting side by side after milking, than from the effect of the foods upon the milk before it is milked. If the best milk that could be brought into the house is put in the pantry with cooked cabbage, the flavor of the cabbage will go right through it.

Ques. If cows are fed the same why will one make nice yellow butter and the other white butter?

Ans. Feed does not do everything. Cows are born with certain physiological characteristics that no man has ever fed out, or by any treatment got out of them. It is the individuality of the cow and not the feed.

Ques. Why should you feed cows twice a day and calves three times?

Ans. Please remember that the cow carries a great big silo with fifty-five gallons of food, and the little calf has simply a little milk stomach which rapidly digests its food. The calf in a very few hours has digested his food.

Ques. When does the calf begin to chew its cud? I did not suppose that the calf would chew its cud until it began to eat solid food.

Ans. If you work in a butcher's shop a little while you will find out that calves until they get to be about seven weeks old have only milk stomachs; and after that the fourth stomach begins to develop, and they begin to crave the stronger, heavier and more bulky foods.

Ques. How large an amount of grain do you feed to the average dairy cow?

Ans. Six pounds of mixed grain is the limit for the average cow; if a cow wants more than that, give her some of the bulky foods. I never have gotten any money out of feeding more than that to a dairy cow, and I doubt if the average dairy cow can digest and assimilate more than that, though there are individual exceptions.

Ques. What kind of grain do you feed and in what proportions?

Ans. I feed almost entirely wheaten shorts; a grade a little better than the thin flaky bran. I vary it a little by dashing in a little corn meal and a little oat meal once in a while. The idea is to give a relish. But for regular feed shorts will stay by a cow better than any other feed that I ever knew of. If I wanted to buy one hundred dollars worth of feed I should buy one hundred dollars worth of wheat seconds. The man who feeds for the large quantity of milk is going to get his butter if the cow will make it. What will best sustain the cow is the best food for milk, and for the thing that you want the milk for.

Ques. Is there as much cream and butter in wheat bran as in other food?

Ans. Yes, sir. I can get the best butter from the best grades of wheat bran. I do not feed any dry grain except in the summer. Our ration for our cows from fall to spring is fifty pounds, (approximately) to a cow per day of ensilage; and we divide the grain, feeding half with the morning ration and half with the evening ration, and following the ensilage immediately with one and one-half pounds of hay. After they have consumed the ration we water, and leave the water running until we get ready to feed again. We do not allow the cows to take a mouthful of food and then a mouthful of water, as they will fill the trough with their food.

Ques. Of what is your ensilage composed?

Ans. Corn fodder, ears and all, cut into the silo.

Ques. What kind of corn?

Ans. We raise Virginia corn of the largest possible kind.

Ques. At what degree of ripeness do you put it into the silo?

Ans. I want the ears to begin to harden enough so that I can find dented ears through the field; then it is ready to fill the silo with the least possible loss of material and the greatest amount of food value. When the corn is tasselling out the feeding value will be represented by fourteen; when the ears begin to form, by twenty-eight and when the ears are ripening, and there is now and then a dented ear through the field, the feeding value of that field is represented by forty-four. By expressing it in this way we can all remember it.

That comparison holds good for all varieties of corn, provided you can get the corn to maturity in the place where you live. Raise Maine corn in Maine and do not try to raise Virginia corn

Ques. You say you are feeding six pounds of bran in connection with corn ensilage that is heavily eared. When you go back to your clover and mixed hay do you increase your grain ration?

Ans. Yes, you will have to do that.

Ques. Wouldn't you add something beside hay?

Ans. The man must be a very rich man who can feed his cows continuously on upland English hay and let his wife burn green wood. We want more starch and we can get it cheaper in corn than in any other way. You can raise five times more starch on an acre in corn fodder than in June hay.

Ques. How does the second grade of bran differ in composition from the first grade of flaky bran?

Ans. I do not suppose there is very much difference; but somebody has got a notion that the coarse bran is worth two dollars or three dollars less a ton than the next grade. I do not see very much difference but the other fellow is willing to pay two or three dollars a ton more for it and so I let him have it. I get a fine bran that shows a trace of white on the side of the bag; that is what we know as shorts. I know somebody will say "You advocated feeding peas, beans, buckwheat and such things, and raising them on your farm;" but the fact is, though I can raise sixty bushels of oats at forty-five cents a bushel, a bushel of oats will make no more milk, butter, cheese or cream than thirty-two pounds of fine middlings. I get twice the feeding value from middlings, twice the manurial value, and have something that the cows will stay by every day in the year. We raise our peas, beans and millet for a soiling crop.

Ques. How does bean meal compare in food nutrients with cotton-seed meal?

Ans. It is about six points below. The bean straw is eaten very rapidly by the cattle for a little roughage through the winter.

Ques. You spoke of feeding your ensilage with your other coarse fodder. Wouldn't you feed some cotton seed meal?

Ans. Nobody feeds cotton seed now in Ohio. We have had our spell of it. When the ensilage is used up I put in a little more bran, and feed some of the oat hay or bean hay which I have saved; but I have found out that it will not pay to be without ensilage, but it does pay enormously to have ten or fifteen tons of it to feed in August.

Ques. Which of the millets do you use?

Ans. I use a kind that has a sprangly head. The Japanese millets have come in with us this year; I do not know whether we are going to like them or not.

PLOWS AND PLOWING

BY JOEL RICHARDSON of Newport. Member from Penobscot County Delivered at Amherst, August 25, 1894.

It is now some years since the subject of plows and plowing has been discussed at any of our institutes. And perhaps some have thought that everything has been said that could be said on the subject and that no one needed any further instruction or suggestions about plows and plowing. But any observing farmer who travels over our State during the farming season cannot fail to see that plows and methods of using them have not arrived at perfection. We need line upon line and precept upon precept on this primitive but very important part of the cultivation of the soil. No after cultivation however thorough and skillful can fully make up for imperfect work in plowing. And notwithstanding the great number of farms and kinds of material of which plows are made no man has yet seen a *perfect* plow. The objects of plowing are to pulverize the soil to mingle the different portions to cover and kill the weeds to cover manure and to keep the surface open and fresh. And the nearer we approach perfection in these directions the nearer we are to perfect plowing. Pulverization is the most important thing to be accomplished and is the one which receives the least attention in the construction of plows.

The two points to which plow makers have directed their efforts more than all others have been ease of draft and ability to invert the sod completely so as to leave the field after plowing smooth and level. This is best accomplished by a long concave mould board. But this method of plowing leaves out of account the most important object of plowing—pulverization. The sod is taken up, inverted, and laid down again without any short twist to move the particles on each other and leaves the furrow slice nearly as hard as before it was taken from its bed and no amount of harrowing will pulverize it as well as it will when all of the particles of the soil have been moved on each other by a proper twist of the sod while being inverted. No first rate plowing will leave a smooth level surface of inverted sod. Ease of draft is a desirable quality in a plow but must not be obtained by sacrificing other and more important qualities. Ease of draft depends much on the material of which the plow is made. If made of hard steel or chilled castings which wear smooth it draws much easier than when the plow is made of soft brittle cast iron. A mould board should be convex at its lowest and front part, concave at its middle and rear with a sharp twist at the upper rear corner where the sod leaves it. The mould board should not be very long. Doubtless a long mould board makes the draft easier but it will not pulverize as well. The landside should be of good length and have a good bar at its lower left hand corner. On these two qualities of the landside the steady running of a plow mostly depends, as it is not so easily thrown out of place by slight obstructions. The point should be of sufficient length and obliquity to hold the plow well to the ground but not so long as to draw downward unnecessarily hard, thereby increasing the pressure on the sole of the plow and on the truck. The share should be wide enough to make the distance from the left hand edge of the landside to the right edge of the share about three inches less than the width of the furrow to be turned. That is if the furrow is to be fifteen inches, the distance across the bottom of the plow should be twelve inches. This leaves three inches of uncut sod which keeps the right hand lower edge of the sod in place and makes a pivot point on which to turn the sod and prevent its being pushed outward at the bottom. The handles of the plow should be inclined well backward, and if some simple device could be applied for raising and lowering them it would be an improvement. The beam of the plow is an important part and none I have seen are quite satisfactory. The common oak beam if not too long and too straight is very good. But the present manner of attaching it to the plow is very unsatisfactory. I believe that the coming beam for the plow will be made of steel well arched over the throat of the plow and pivoted on the main bolt from three to five inches according to the size of the plow to the right of the line of the landside and fastened to a bar between the handles with a device to move it to the right or left. The arch of the beam almost entirely prevents clogging by sods, strawy manure or stones. The setting to the right of the left line of the landside balances the plow so that it is much easier to hold. And changing at the end between the handles gives much better control in making the plow land more less than can be done by any device at the forward end of the beam. The cutter should be attached to the beam a little forward of the point in line with the landside and only go deep enough to cut the sod so as to have the edge of the furrow slice straight. The truck or roll should be attached as near as possible to the forward end of the beam. What has been said is about the sod or breaking plow. The seed plow should be constructed to make a deep, narrow furrow. The main objects in plowing old ground being to lighten, pulverize and mix the upper and lower parts of the soil and not to completely invert as in breaking up the sod. Only oak timber and steel should be used in making plows and these of the best quality. The time is past for making farmers' implements and machinery of brittle heavy cast iron and brown ash timber. And if we will persistently refuse to buy such stuff to load our teams and to be ever repairing we shall soon have our implements made of good material and much lighter and stronger than we are now using. Of sulky and swivel plows I have little to say having had no experience with either. Some of my neighbors are using them but I have seen none of their work that I called good plowing. Most Maine farmers have too many stones for sulky plows. The swivel plow is very useful for side hill farms. But for level land I think most Maine farmers will be satisfied when they get a plow that will do first rate work one way and will not expect to see a plow that will do perfect work two ways.

HISTORY OF PLOWS—CHICAGO.

After having obtained a good plow the next points are to have a good plowman to guide it, a good team to draw it and a good driver to drive the team. Unless you have all of these you will not get first rate work. The proper adjustment of all parts of the plow so that it shall swim fair is very important and requires some skill and judgment. Different kinds of soil, different depths and widths of furrow require different adjustment. Some of the necessary changes can be learned only by practice and experiment but many of the adjustments depend upon mechanical principles with which every farmer should become familiar. So that he may not only be able to handle the plow well himself but also be able to give clear and definite instructions to his sons or hired men. The team for plowing should be strong enough to carry the plow steadily along and not give back for slight obstructions or to be obliged to over-exert their strength thereby moving forward with a jerky uneven motion. Lack of strength in team often tempts farmers to plow shoaler than their best judgment dictates. So that the grass is not well covered and there is not sufficient depth of soil to make a good seed bed.

Close attention on the part of the plowman and driver of the team is necessary at all times to keep the plow in its proper place. After having obtained a good plow and team, the next thing to give attention to is the laying out of the land to be plowed so as to be able to do the best work with the least outlay of time and strength. Where land is level or nearly so and free from obstructions you have only to take the longest way so as to make as few turns as possible. But most of the land in Maine is more or less ups and downs and careful attention to the field to be plowed and good judgment is neccessary to divide it into lands so that as much as possible may be turned down hill. If the land is inclined to be wet in ordinary seasons, plow up and down the slope as the space beneath the sod allows the water to drain down the slope. If the land is dry so that it is desirable to retain the water that falls on it, plow across the slope if the incline is not so steep as to prevent turning the furrow on the up hill side. If fences or other obstructions prevent driving out at the ends, leave sufficient space on which to drive out and turn the team. Plow the head lands last. This method gives better ground on which to turn and makes it easier for men and team.

In plowing the head land turn it all one way usually from the fence, this leaves no ridge or dead furrow and is in better shape for the harrow. When practicable the first furrows of the land should be turned together where the dead furrow was when the land was last plowed and have the dead furrow of this plowing where the lands joined before. If the land to be plowed slopes inward toward the center on all sides a good method of plowing is as follows: Measure across the land the narrowest way, find the center, then measure from the end on the center line a distance equal to one-half the width and set a stake. Then measure from the other end on the center line and set a stake. Then set in your plow at one of the stakes and turn a furrow on line to the other, then turn around the stake to the right and go back to the first plowing across the end as soon as there are any ends to plow. Continue this until the land is finished. And if you have measured correctly and plowed even on all sides your last furrow will go around the margin of the piece and you will have plowed the entire land without necessarily setting a foot upon the plowed land. The only objection to this method of plowing is that a portion of it will not be plowed across the furrows at the next plowing. No unyielding rules can be laid down for modeling and constructing plows nor can any method of plowing be adapted to all kinds of land or under all circumstances. The best that the farmer can do is to fully understand the underlying principles involved, keep clearly in mind the object to obtain and carefully observe the effect of this or that method of practice and never let his interest in this primitive but very important part of the farmer's work give way to apathy and neglect. No paper on plowing would be complete without something being said about the time to plow and the depth of plowing. At this time the general trend of instruction given is to do all or nearly all of our plowing in the fall.

While it is desirable to do as much of our work as possible in the fall so as to help out the short busy seed time in the spring it is hardly possible to have a good seed-bed unless the plow has been used a short time previous to planting. While press of work may make it expedient to sow without spring plowing it is not possible to give the roots of plants the best chance to obtain plant food from the soil unless the soil has been loosened to greater depth than can be done with a harrow. There is no danger of plowing land too often and we must not lose sight of the fact that roots of plants will strike out in all directions for plant food if the soil is sufficiently well pulverized to admit of their finding a passage among its particles. This extension of roots enlarges its pasturage and brings more plant food within reach of the growing plant.

There is great diversity of opinion among farmers as to the depth of plowing. Most Maine farmers are inclined to shoal plowing. And one rarely meets a farmer who has given deep plowing a fair trial. It is so much easier and cheaper to plow shoal that only a few will try deep plowing. They reason that when land is plowed deep the manure is buried too deep and is carried still further downward by rains, and the roots of plants do not go deep enough to reach the fertilizing elements. This reasoning would be conclusive if based on actual fact and true principles. Good soil will absorb and hold most of the elements used by plants and give them up only to the rootlets of the plants. While some like lime, and potash may be washed downward, other elements are inclined to rise toward the surface with the water brought up by capilliary attraction. If the soil contains an equal amount of plant food for several feet in depth it certainly must be better for plant growth to have two or three feet of soil to draw from than only six inches as is usually the case with shoal plowing. With the exception of small areas here and there Maine soil is too hard and dense to admit the extension of roots any deeper than the plow has gone. Deep soil, whether natural or made so by deep plowing, allows the water to sink downward rapidly so that land may be worked sooner after a heavy rain, and deep growing roots find moisture containing plant food when the surface soil is dry and barren. The depth to which roots of plants will grow when the subsoil is sufficiently open is not generally understood. I have washed out roots of Timothy two feet below the surface and have seen them three feet below. Mr. Terry of Ohio told me that he had washed out roots of the potato one and one-half feet and of wheat three feet below the surface. If farmers will investigate they will find that all growing plants send down roots much deeper than is generally supposed wherever the subsoil is loose enough to admit them. I will mention two instances in favor of deep plowing. Many more might be added. An old farmer in Readfield told me that the best acre of corn he ever raised grew on land he plowed twelve inches deep. And at a government experiment station in Kansas five and seven-eighths acres of land plowed one foot deep yielded four hundred twenty bushels of oats or seventy-one and one-half bushels per acre, weighing thirty-seven pounds per bushel. While one acre alongside the same, plowed four inches deep, yielded eighteen bushel weighing only thirty-two pounds per bushel. The plow in its present state is not the work of one man but the result of the studies and experiment practice and observation of many men of many centuries. Let us see that progress in construction of plows and in methods of using them still goes forward so that the plows and plowing of the next generation shall be better than the plows and plowing of the present.

PROFITABLE POULTRY RAISING.

By A. H. HUNTER, South Natick, Mass. [Editor of Farm Poultry.] Delivered at Brewer, Foxcroft and South Norridgewock.

The interest in poultry raising is extending very rapidly. As compared with fifty years ago the production of eggs and dressed poultry has increased to a wonderful extent. This increase in production, however, has been no more rapid than the increased consumption of poultry products, and I venture the prediction that we have seen only just the beginning of the development of the industry.

Fifty to seventy-five years ago such things as poultry farms were unknown. Every farmer kept a few hens to supply eggs

"To put in cake or fry with bacon,"

and each year raised a few broods of chickens with which to replenish his laying stock and supply the family table with fried chicken or chicken pie a few times in the course of the year. Very few eggs or chickens found their way from the farm to the market.

Seventy-five years ago, indeed, methods of transportation were so primitive the marketing of surplus farm products was very difficult and the returns, when they were marketed, were mostly in the shape of "trade" at the nearest store. The eggs which were sold in this way often accumulated for weeks in the country stores before being sent to the town or city market, and every one familiar with the delicate composition of an egg knows that it would be far from "fresh laid" by the time it reached the consumer's table.

A GROWING INDUSTRY.

Improved methods of transportation, aided by the demand from our rapidly multiplied city and town populations, have effected a revolution in conditions, and to-day eggs and dressed poultry are supplied immediately to the market requiring them, one result being a doubled, (yes, quadrupled,) consumption, until we have, in the last census year, a consumption of over three hundred millions of dollars worth of poultry products; the egg product reaching a value of $163,441,000, while the dressed poultry reached a total of $142,644,350, the grand total of eggs and poultry being $306,085,350—a sum that is difficult for us to comprehend. And yet this industry is but in its infancy to-day. The revolution in methods of transportation, brought about by the introduction of steam and electricity has effected a wonderful change in market condi ions and made it possible for the bank president, or merchant, in the city, to have cream in his coffee for breakfast which was milked on a hillside farm a hundred miles away the day before, and enjoy the delicate flavor of a fresh-laid egg of the day before, produced on still another farm, fifty or a hundred miles away. The remarkable change in economic conditions is well illustrated by the anecdote of a wheat-king of the northwest, who treated his guests at breakfast to fresh baked biscuits which were standing in ripe grain on the prairie at day-break that morning. The grain had been reaped, threshed, ground and the flour made into biscuits between day-break and the breakfast hour.

The rapid increase in urban population in this country has brought with it a rapid increase in consumption of food products, and eggs and dressed poultry are most decidedly "in it" in popular favor, so that to-day it is required that the product shall keep pace with the increased demand, shall meet the new conditions, and the industry will then move forward with the procession. It requires men of brains and ability to meet (to anticipate) changed conditions, and poultry raising is no exception to this general rule.

QUALITY PAYS.

The great demand to-day is for a better product. A study of the market reports will show a sliding scale of variation of ten to fifteen cents a dozen on eggs, and six to eight cents a pound on dressed poultry, while at some seasons of the year even greater variations will be observed. Why is this? Quality. A poor article brings a low price always, and is hard to sell; the market takes it grudgingly, while a first-class article commands the highest price and moves quickly; is the article the buyer wants and buys on sight. There is great room for improvement in the quality of both our eggs and dressed poultry. Consider eggs for a moment. Every one knows that it is the product (a secretion) of the fowl's body. Anything, then, which influences the physical condition of the fowl affects the quality of the egg. Feed her tainted food and the taint will appear in the egg; allow her body to become congested, diseased, and that condition manifests itself in the flavor or constituency of the egg. It is easy to understand, then, that eggs are very liable to be strong in flavor, or poor in quality, where fowls are fed damaged grain, or city swill, or compelled to drink foul water, or breathe noxious air; and that deterioration of quality has a direct effect upon consumption. If a man attempts to eat an egg at breakfast and finds it strong, repulsive, he not only turns to something else (a steak, or chop, or sausage maybe instead of the egg), but it will be many a day before he will try eggs for breakfast again. In this manner a lowered quality directly checks, retards, consumption. A bettering of the quality, on the contrary, encourages the consumer. He finds the flavor delicate and appetizing, the food elements nutritious, satisfying, and he leaves the breakfast table well pleased with himself and all the world, and "eggs for breakfast" very frequently appear upon the bill of fare of that household. This is no fancy sketch, it is a bit of personal experience and is pre-eminently "realistic."

Consider dressed poultry for a moment. Why do fresh-killed chickens range in price to-day from fifteen cents down to ten, and fowls from eleven cents down to seven? What is the reason some chickens sell quickly at fifteen cents a pound while others are sluggish, move slowly, although offered at ten cents? Quality! The low-priced, slow-selling goods are the lean, skinny, dark pin-feathered, thin-breasted, blue-skinned birds that suggest hunger, and lice, and poor quarters, and no care. That is the poultry that, living, pays its owner never a cent of profit, and, dead, brings the lowest possible price and is slow-selling, sluggish, on the market. On the other hand the plump, full-breasted, bright-yellow-skinned, small-boned chicken is hung in the prominent place in the market-man's window, is seized eagerly by the intelligent caterer, who well knows the delicate flavor of its toothsome flesh. That is the poultry that sells quickly and brings the highest market price, while the lean, skinny things hang waiting for a buyer day after day. These latter make poultry a by-word and reproach; they are a positive injury to the business, they check and discourage the consumption of poultry as a table delicacy. This question of quality is an important one. With yearly sales of 142 million dollars worth of dressed poultry, an appreciation of a third (from nine cents a pound to twelve) means the addition of forty-seven million dollars a year to the selling value of that one article, and when it is considered that such an increase in quality would mean a very considerable increase in table consumption, also, its importance is perfectly manifest. An eminent poultry writer in a personal letter to me a few weeks ago spoke strongly upon this subject, and he exclaimed, in closing, "the great secrets of profitable poultry for the future are increased quality, which will mean better prices and more poultry consumed, and lower cost of production, resulting from more intelligent care and management."

So important is this question that the great packing house of Armour & Co., in Kansas City, are publishing an advertisement in poultry and agricultural papers circulating in the section of country from which their consignments come, urging the farmers to buy pure bred Wyandotte, Plymouth Rock or Indian Game males to grade up their flocks, which will result in a plumper bodied bird coming to them to be dressed for market. They can pay two or three cents a pound more for good poultry than for poor, and as they are dressing about eight tons a day, three cents a pound makes a difference of $480 a day—$144,000 a year. As their commissions are made on their sales we can easily see the profitableness of paying for advising farmers to improve the quality of their poultry; the commission on $144,000, increase, would pay for a tidy bit of advertising.

THREE "GOLDEN" RULES.

An improvement in quality of our fowls would give us an increased profit in another direction, in eggs, namely:

It is easy to understand that the better bred and better cared for fowls will lay more eggs than the lean, skinny, go-as-you-please dunghills. It costs the market value of five dozen eggs to feed a fowl a year. If she lays but seventy five eggs and it takes sixty of those to pay for her food, there is but a small margin of profit, while the laying of one hundred and twenty-five eggs in a year gives us the sixty to pay for her food, and a goodly number for profit, besides. It does better than that because the increase comes at a time of year when eggs are scarce and high, and the increased egg-yield has the double advantage of selling at high prices, also. The principal reason, practically the only reason, for the high prices of Thanksgiving to Christmas, and so on through the winter, is that the great bulk of the pullets haven't begun to lay and the old fowls haven't recovered from the moult, and the keynote of doubled egg yield and twice doubled profit from our fowls, can be easily stated in three short rules, namely:

1. Hatch the chickens early.
2. Keep them growing so the pullets reach laying maturity before cold weather overtakes them.
3. Keep them laying by good care and good food.

The whole story of profit from the egg side of our subject is in those three short rules.

When I say hatch the chickens early, I do not mean too early, because if hatched too early and got to laying in August and September they will usually moult in December, just as the weather is becoming very cold, and then good-bye to eggs from then till April. For the heavier varieties, such as Brahmas and Cochins, the last of March is none too early, but the Plymouth Rocks, Wyandottes and Langshans, we would hatch the first half of April, if possible, although during April will do very well. The Spanish varieties, the Minorcas, Leghorns, Hamburgs, etc., should be hatched in May for best results.

MIDDLEWEIGHTS AND CROSS-BREDS.

I give the preference to the "Middleweights," as some writers call them, the Plymouth Rocks, Wyandottes, and Langshans, and of these the Langshans will probably come to laying maturity first, and be the most persistent layers; the Plymouth Rocks will come to laying promptly and be good layers; while the Wyandottes will be a bit longer than the Rocks in maturing, but will produce quite as many eggs before the year is out. Pullets of a first cross of brown Leghorn male on Plymouth Rock females, or a brown Leghorn male on light Brahma females, or a white Wyandotte male on light Brahma females, have been among the best layers on our farm. By cross-bred birds, however, I do not mean common "dunghill" fowls, which have been inbred till scarcely an atom of vigor remains, and no trace of the parent stock is discernible; but thoroughbred birds cross-mated as named.

In keeping the chickens growing I follow the rule of sweet, wholesome food, fed five times a day for six weeks (or thereabouts), then four times a day till the pullets are brought into the pens to become the laying stock; up to that time they have the free range of the farm, being moved out into the mowing fields and colonized there as soon as the grass is cut off. The cockerels should be separated from the pullets as soon as they can be picked out, and sent to market as early as possible and the pullets given every opportunity to grow.

If the pullets are got to laying early and kept laying we have got the cream of their egg yield within a year of laying maturity, hence the advantage of selling them before they moult, and replacing them with the next generation of laying pullets. By this plan the sum the old fowls sell for is added to the total receipts. It costs nothing to raise the pullets to take the place of the old stock, as the cockerels hatched with the pullets will sell for enough to pay for their own food and that of the pullets, too; hence it costs only the labor to raise them.

ELBOW ROOM.

An essential part of our plan for keeping the pullets laying right through the winter is plenty of elbow-room. That two is company and three a crowd is particularly true of poultry, and if one has pen space for twenty fowls it is the greatest folly to crowd thirty or forty into it; the crowding will induce various vices, as feather pulling, egg eating, etc., resulting in fewer eggs from the thirty or forty than from twenty properly treated. We divide our house into pens twelve feet square, and put fifteen layers in each pen; with one hundred and forty-four square feet of pen space each bird has about ten square feet of room. The outside run (yards) are twelve by one hundred and twenty-five feet, which gives each bird one hundred square feet of run, sufficient to enable grass to grow all the growing season, which saves much labor and simplifies the problem of care and feeding.

If one prefers, he can avoid the expense of fencing the yards by building individual houses about one hundred and fifty feet apart, shut in the pullets put in each house for three or four days, and then let them range at will. An excellent plan for such a house would be one eighteen feet long by ten feet wide, four feet high at the back and six feet high in front, with a lean-to (shed) roof. Such a house divided into two apartments, one 8x10 feet would be the roosting and laying room, and the other, 10x10, all open front to the south, would be the scratching shed, sun-bath, and fresh air bath-room, would cost not more than forty dollars and would give ample accommodations for thirty fowls; and such a house with cloth curtain tacked to movable frames with which to close the open front in stormy weather, makes the best possible quarters for laying fowls.

FEEDING FOR GROWTH.

We gave, as our first rule for getting a good profit from poultry, hatch the chickens early. Equally important is the second, keep them growing so that they will come to laying maturity by November first. The food and care has much to do with keeping the chicks growing, and a brief description of our method of feeding may be helpful.

Let them alone till they are at least twenty-four hours old, or until the morning of the second day. They need no food during this time; nature has provided for that by absorption of the egg yolks into their little abdomens, and it is necessary that this absorbed egg yolk be digested and assimilated before any other food goes in. Much damage is done and many chicks' lives lost by disregarding this rule. Some people in their feverish haste to "get the chicks growing," hurry food into their crops before the system has been toned up to take care of it, and the consequence is the bowels are congested, dysentery sets in, and the chick goes over to the majority.

We always set the hens in pairs, so the chicks from two hens may be given to one, allowing the other to be reset. When a brood is to come off we take a covered basket to the nest, extract all the chicks from under one hen and put them in a basket, then lift the other hen from the nest to a safe position under the left arm, leaving the right free to capture her chicks and add to the basket, then take basket and biddy to a coop previously made ready in a sunny grassy spot. Putting the hen down within the coop, the basket is tipped upon its side near her and the downy little things run out to her protection.

An egg has been previously boiled hard and chopped fine, shell and all and mixed with double the quantity of bread crumbs, and this is set before them for their first meal. To be sure, biddy gobbles about all of it. No matter. She has worked hard, half starving herself to bring forth this promising little flock, and a good feed now will help to make her contented and happy, consequently a better mother.

Feed often and feed but a little at a time, is the best method; every two hours, say five times a day, till the chicks are five or six weeks old, and see that no food is left standing in the sun to sour after they have eaten; remove it all. Nothing causes more bowel looseness and dysentery than sour food.

Our chief foods for the first six weeks are coarsest oatmeal slightly moistened with sweet milk, and waste bread from the hotels and restaurants. This bread consists of broken pieces of bread, rolls, tea and corn cakes, etc., and is an excellent chicken food. We spread it on the attic floor to dry, and then grind it to coarse crumbs in our bone mill. The first feed early in the morning is this bread crumbs slightly moistened with sweet milk (or water); the second, about nine o'clock, is oatmeal moistened as above; about eleven o'clock bread crumbs again, about half-past one oatmeal again, and about four o'clock a little cracked wheat or cracked corn.

There has been much dispute as to how soon dry grain or cracked grain could be fed to chicks. An article upon chicken feeding, by Mr. W. Vale, in Feathered World (London), says: "The chick cannot be too soon supplied with food that will require the grinding power of the gizzard to be properly brought into action. Soft food will not do this consequently more or less dry food must be supplied. In the gizzard, with the aid of some grit, the woody fibre enveloping the more nutritious parts of seeds and grain is ground into atoms, also the nutritious parts thus prepared for digestion and assimilation. Some gritty substance is absolutely essential; for, without it the gizzard cannot properly perform its work. Even baby chicks should be fed upon a sanded floor. The gritty matter should be as hard and sharp as possible, so that it will grind up bones and such like substances. When chicks are young, broken wheat, coarse oatmeal, canary seed and hemp seed are each very suitable. They should not have much, if any, Indian corn, as it makes them too fat, and thus renders them liable to a variety of ailments. For stock purposes a fat fowl is worse than useless, for its progeny is almost certain to be weak.

Green food must be supplied. If the chicks are cooped upon fresh grass the problem is solved, and they will help themselves to what they need. If, however, they are confined in small yards, finely cut grass (as from the lawn mower), onion tops chopped fine, lettuce leaves, or even boiled vegetables will make a good substitute. The grass run is *the* thing if possible, and substitutes are only suggested where the grass run is unobtainable.

Fresh, cool water is kept constantly accessible, and a drink can be taken when wanted. Grit is another necessity. Don't think the chicks can find this themselves. This is one of the commonest mistakes in rearing chicks. Have a little dish of mica crystal grit, or fine gravel, or coarse sand, or broken oyster shells, or broken crockery, or pounded bricks, or even fine clinkers from coal ashes (such as will pass through a quarter-inch mesh sieve, but won't pass through an eighth-inch mesh sieve), all these are good, and one of them at least is get-at-able.

For the benefit of those who cannot get waste bread we give Mr. I. K. Felch's rule for his excelsior meal bread. "Grind into a fine meal in the following proportions: twenty pounds corn, fifteen pounds oats, ten pounds barley, ten pounds wheat bran. We make the cake by taking one quart of sour milk or buttermilk, adding a little salt and molasses, one quart of water in which a large heaping teaspoonful of saleratus has been dissolved, then thicken all with the excelsior meal to a little thicker batter than your wife does for corn cakes. Bake in shallow pans till thoroughly cooked. We believe a well appointed kitchen and brick oven pays, and in the baking of this food enough for a week can be cooked at a time."

Wright's "Practical Poultry Keeper" says: "With regard to feeding, if the question be asked what is the best food for chickens, irrespective of price, the answer must decidedly be oatmeal. After the first meal of bread crumbs and egg, no food is equal to it, if coarsely ground and only moistened so much as to remain crumbly. The price of oatmeal is, however, so high as to forbid its use in general, except for valuable breeds; but we should still advise it for the first week in order to lay a good foundation."

We are obliged to differ with Mr. Wright as to oatmeal being an expensive food for chicks. It certainly looks expensive to pay six dollars a barrel (three cents a pound) for oatmeal for chicken food, but it spends so well, goes so far, that we have found it an economical food. We used fifty dollars worth last year, practically ten cents per chick raised, and it made two-fifths of their food from shell to laying maturity. Considered simply as a food ration, it is economical, but when we consider that "good foundation" which it makes it becomes even more desirable. A good foundation in the chick means eggs in the basket the next fall and winter, hence oatmeal is a cheap food, in the best sense of the term.

For the first six weeks I feed five times a day, or about once in two and one-half hours, and after the chicks are six weeks old I feed four times a day.

The breakfast is bread crumbs, continued until they are about ten weeks old, when they are graduated into the morning mash such as we feed to our fowls. About ten o'clock they have a feed of the coarsest oatmeal moistened; about half-past one o'clock a light feed of cracked wheat or cracked barley (the latter is a by-product of a cereal manufactory, and an excellent food), and about five o'clock whole wheat or cracked corn, one, one day, the other the next. Twice a week we have fresh meat (butchers' trimmings) cooked and chopped, which is mixed in with the coarsest oatmeal (about half and half) for the second feed. We have, also, a Mann bone cutter, and twice or three times a week the chicks have a good time wrestling and tumbling over each other in their eagerness to get the fresh cut bone.

Not having a bone cutter, we should mix some bone meal into the moistened bread crumbs for breakfast, and about three times a week we sprinkle in a little Sheridan's Condition Powder as a condiment to promote digestion and good health. We intend to vary the food ration continually within the range here described. For instance, one day the food will be bread crumbs, oatmeal, cracked wheat, cracked corn; the next day, bread crumbs, oatmeal and chopped meat, cracked barley, whole wheat; the next day, bread crumbs, cut bone, oatmeal, cracked corn, and so on. The rule is to feed only what the chicks will eat up clean and quickly; but we break over the rule so far as the last feed is concerned, and the boy goes around a second time, twenty to thirty minutes after feeding, and if it is all eaten up clean, three or four handfuls more are put down, so that all shall have a chance to "fill up" for the night. If a handful is left uneaten it quickly disappears in the morning, and as it is always dry grain, it does not sour, and there is no danger from leaving a little. Grit, in the shape of screened gravel, is also always by them, and ground oyster shells are given them about twice a week. As there are no trees in our fields we provide a temporary shelter for shade, making a slanting roof near each coop. This helps each family to identify its own home, and, besides shelter from the hot sun, is shelter from the rain also, and the feed boards are put under it in wet weather. With this liberal feeding of a varied food ration the pullets will begin to lay in October and the fowls are then turned off to the butcher, the houses cleaned up and whitewashed and the pullets moved in.

FOOD THAT MAKES EGGS.

From that time we "feed for eggs" as follows:

Five mornings in the week we feed a mash made up of about a third cooked vegetables mashed fine, or cut clover cooked by being brought to a boiling heat in water, an equal amount of boiling hot water added, a heaping teaspoonful of salt to a bucketful; a heaping teaspoonful of Sheridan's Condition Powder. Condition powder two days, then powdered charcoal one; and into this is stirred mixed-meal, until the mash is as stiff as a strong arm can make it.

This mixed-meal with us consists of one part each corn meal, fine middlings, bran, ground oats, and meat meal, a scoop or dipper of each being dipped in turn into a bag and poured from the bag into the meal barrel from which it is dipped into the mash. We consider the thorough mixing of these meals a considerable factor in making a good mash.

When we have cut fresh bone in abundance we omit the meat meal from the mixture; ordinarily we have only about half-rations of cut bone to go round, so use, regularly, half the amount of meat meal to make up the deficiency.

An excellent mixed meal is "Germ-Meal," made by the American Cereal Company, Akron, Ohio, and consists of equal parts corn, oats, barley and wheat ground up together and kiln dried before bagging for shipment. We consider it not quite sufficiently nitrogenous, so add from a quarter (in winter) to a third (in summer) of shorts to it. As it is not always easy to get germ meal of our grain dealers about here, we make up the mixture as above, and the fowls will complain little of that mixture in their mash.

The foundation of the mash is the cooked vegetables, which may be refuse potatoes, beets, carrots, turnips, onions (anything in the vegetable line), and into the pot goes the table waste, potato parings, etc., and the potato, squash, and apple parings from the kitchen. The potatoes, or beets, etc., are washed before putting on to cook, and the mess when boiled is sweet and savory. If one has a set kettle in which to stir up the mash, and there leave it to cook in its own heat and the heat of the brick work, they are fortunate. We haven't, and have to make ours up in common water pails (buckets).

The vegetable or clover kettle is put on before sitting down to dinner, usually, and another kettle of water to be boiling hot when wanted. When the vegetables are cooked, we set out four buckets in a row, dip out the vegetables into the buckets about equally, mash them thoroughly, add the salt—always—and the condiment of the day, add boiling water until the bucket is two-thirds full, then stir in of the mixed meal till it is stiff and firm; then cover and set away to cook in its own heat.

Clover rowen (second crop clover) cut fine makes an excellent foundation for the mash, and two or three days of the week in winter we use that instead of vegetables. We fill two kettles with the cut clover and as much cold water as they will conveniently hold, and heat to a boil. The clover is ladled out into the buckets about equally, the clover tea added and boiling hot water as before, then salt and the stimulating condiment and the meal stirred in.

This mash, you will notice, contains a great variety of food elements, and this variety is quite an important factor. A fowl needs a variety of food to supply her various physical needs, and give her a surplus out of which to make eggs, and this "variety" of foods we believe we can best attain in the manner described above. An additional advantage is that a tonic or stimulant can be added if desired. We sometimes substitute a teaspoonful of tincture of iron for the condiment, and sometimes add a handful of linseed meal or cotton-seed meal; but the latter are somewhat fattening (as well as stimulating), and those who feed their fowls well must beware of too fattening foods.

Some poultrymen make a practice of stirring up the mash scalding hot in the morning and feeding it at once. In that case the meals are simply scalded, are not cooked. By our method the meals are semi-cooked, and more immediately available for assimilation; hence we prefer making up the mash the afternoon of the day before, and having it semi-cooked when fed, to having it fed hot but only scalded.

This morning mash is fed in troughs large enough so that all of the fifteen fowls in a pen can get about it at one time,—another important factor, because if the trough is small some of the birds have to stand back and wait for second table, and when their chance does come there's nothing left for them. With a trough four feet long by six inches wide, there is plenty of room, and if a biddy is driven away from one place she runs around and goes to eating at another, and thus all get a share.

Our fowls have exercise ground in summer, in yards 125x12 feet, which give them a grass run with growing grass always in the growing season, and they will take ample exercise in pleasant weather. To keep them out of doors the noon feed of whole barley (or buckwheat) and night feed (before sunset) of wheat is scattered upon a graveled space immediately in front of the houses. Each family of fifteen has a pen within the house twelve feet square, or 144 square feet of floor space, which gives about ten square feet per fowl. The floor is the earth covered about six inches deep with screened gravel. On this gravel inside the house the grain is scattered in stormy weather in spring, summer and early fall, when we want the birds to stay indoors. When cold weather approaches, exercise must be stimulated, and we cover the pen floors three or four inches deep with meadow hay or straw, into which the grain is scattered, and the biddies have to dig it out. Some poultrymen use dry leaves for pen-litter; chaff from a threshing mill, or buckwheat hulls, would be most excellent (nothing could be better), and we have found one or two cases where common cornstalks were used. With us, straw or meadow hay is most easily obtained, and we use that. What the scratching material is, is of far less importance than that the scratching material is there.

Whole wheat is the best grain food for fowls, whole barley is the next best, and buckwheat next. We make barley or buckwheat the noon feed five days in the week, and wheat the night feed five or six days in the week. We do not make the mash on Sunday, because we want to reduce the work to its lowest terms on that day, doing no more than the regular feedings and waterings, and collecting the eggs.

A WEEK'S BILL OF FARE.

Monday we feed oats (or barley), wheat, whole corn.
Tuesday we feed mash, barley (or buckwheat), wheat.
Wednesday we feed mash, cut bone, wheat.
Thursday we feed oats, barley, wheat (or corn).
Friday we feed mash, barley, wheat.
Saturday we feed mash, cut bone, wheat.
Sunday we feed mash, barley (or buckwheat), wheat.

Two feeds of cut bone each week, one or two of whole oats, and one or two of whole corn (according to the season), give variety to our ration, and to that is added whole cabbages hung in the pens in cold weather to tempt picking them to get green food; or turnips, or beets, or carrots are split in halves and placed in the pens to be picked in pieces and eaten.

Mica crystal grit and ground oyster shells are always accessible, and fresh water, replenished three times a day (warm in winter), and the water-pans are carefully rinsed every day.

We vary from this program in winter by feeding a slightly lighter feed of mash in the morning, making it a break-fast rather than a full meal, and then scatter barley or buckwheat in the scratching material about midforenoon, to induce even more scratching exercise. To search and scratch for seeds, grains, insects, etc., is the fowl's normal method of feeding, and the nearer we approximate to nature's way, the better; hence the greatest possible amount of exercise should be compelled.

HOW POULTRY PAYS.

By carefully following this method of raising early laying pullets and keeping them laying, we can get 150 to 175 eggs apiece from a fowl by the time she is seventeen months old. Then turn her off to the butcher and put another early laying pullet in her place. One hundred and fifty eggs is twelve and one-half dozen, which, at the average price of twenty-seven cents a dozen, gives a gross return of $3.37 for eggs alone. Add the fifty cents which the fowl sells for alive and we have $3 87 income per fowl in a year. Allowing $1.37 as the cost of her food (and it costs about $1.37 a year to feed a fowl and feed her well), and we have $2.50 as the net profit on each fowl kept. There is no magic about it. It is a simple problem of hatching the chickens early, keeping them growing so they begin to lay before cold winter overtakes them, and then keeping them laying. It is the winter eggs, the eggs laid when prices are high that pay the profit. Here are the figures of one hundred and twenty-five fowls on our farm in December, January and April:

	Number eggs.	Sold for.	Profit.
December	1,626	$51 49	$37 43
January	2,068	51 70	37 64
April	2,232	27 50	13 84

December and January eggs paid each over $37 profit, while April, with a larger number of eggs, paid but $13.84 profit. Everybody's hens are laying in April, eggs are low in price, and pay very little profit after paying for the food. The point will be even better understood if I cite an experience on my farm in December, 1893.

I had then three hundred and eighty fowls, ninety of them being year old hens, and two hundred and ninety pullets. They laid in the month of December 3,957 eggs which were sold at forty down to thirty-two cents a dozen, giving us in round numbers $130, in cash. The food bill at $1.35 per fowl a year, is eleven and a quarter cents a month, and for the month of December would be $42.75 for three hundred and eighty, leaving us the comfortable profit of $87.25. Most farmers will admit that that is a pretty fair return for one month's care and feeding of three hundred and eighty fowls, but it should be borne in mind that that comfortable profit was planned for in the early hatching of the chicks and in feeding them, for rapid growth and early maturity, and then, when we had got them laying we took good care of them and kept them laying. The whole story of profitable poultry raising is in living up to those three simple rules.

ABSTRACT

OF

Cattle Commissioners' Report.

A summary of the whole number of stables and herds of cattle inspected by our commission in 1894 will be found to be two hundred and one, as opposed to one hundred and forty-three in 1893, an excess of fifty-eight cases. Ninety-two herds of cattle were inspected, while the number of stables of horses examined for glanders and farcy was one hundred and eight, which exceeded the number of last year by forty-six, and there is a very apparent cause for these latter inspections which will be given later in the report.

Forty-six head of cattle were condemned and destroyed at an appraisal of $1,485.50, and sixty-four horses were also condemned and destroyed at an appraisal of $2,692.50, the total amount of appraisals for the year being $4,178.

Our quarantine against Massachusetts is still in force, and the recent public and private developments in that State under the workings of their new law will render it entirely unnecessary for us to give any new or further reasons for its continuance.

In his annual address Governor Cleaves struck the key-note when he said, "The protection of the live stock of Maine against contagious disease is of great importance, and any neglect of this duty may entail upon the owners very large losses. The appropriation for this purpose for the past few years has been insufficient to meet the expenditures that were necessary to properly guard this interest and fully protect the public health. The sum appropriated having been exhausted in July last, the Governor and Council authorized the commissioners to expend an additional sum of $1,000 in carrying forward their necessary work, which amount has been paid from the treasury. We are now appropriating large sums of money to protect our fish and game, and certainly we should not neglect to make an adequate appropriation for the protection of our herds and flocks."

The largely increased number of inspections made during 1894 over any previous year, plainly show that the demands upon us are increasing, and we feel that much sanitary work is left undone that should receive more attention from the cattle commission than the present law and appropriation adequately provide for. The proper disinfection and care of premises out of which diseased animals have been taken should be under State control instead of being left to owners who generally underate the importance of the work, or neglect altogether to give it their attention.

The humane killing of such animals and their proper disposal afterwards, is open to the same objection and still no provision is made for such work being done under the present law, and no money appropriated for the purpose.

Several cases have come to our knowledge the past year where repeated cases of glanders have been found in stables out of which some horse had been previously condemned and where such horses after being inhumanely killed have been left above ground for fox bait or for dogs to devour, and thus scatter the disease broadcast all over the State.

There is another feature of our oversight of dairy herds that has been heretofore overlooked or underrated, in allowing consumptive people to act as attendants upon milch herds. The recent reports of the Johns Hopkins Hospital prove that the expectoration of a single consumptive patient was about four ounces in twenty-four hours, and that it contained more than four thousand million of bacilli in a single day. The proper disinfection of tuberculous sputum would seem out of the question in barns and stables where phthisical persons have the charge of feeding and milking dairy animals, and it should be remembered that the germs exist in all discharges from tubercular foci and are constantly accumulating to form vast storehouses of dust in which the bacillus retains its vitality for years only to reproduce the disease in the future occupants of the same stable.

Since our last report was issued a very important discovery has become generally adopted in diagnosing tuberculosis in all stages of the disease, by the use of tuberculin. Massachusetts is depending almost wholly upon this agent, and out of three thousand and nine hundred cases recently disposed of in that state only six cases of failure are reported. The system of tuberculous patients being charged with the toxalbumins of the germ of the disease the product of the germ is nothing more or less than tuberculin. The addition of a small amount of artificially prepared tuberculin to that already contained in the system causes a temporary fever, or reaction, in from two to fourteen hours after the injection. The reaction varies from one to six degrees above the normal temperature. In healthy subjects the quantity of tuberculin injected is so small that the animal is not affected by it. Reports are unanimous in support of this statement. If Maine is to keep abreast of the times some provision should be made for its future use, although there is very little probability that its general adoption will be needed in this State.

Before closing our present report, we would call special attention to the great increase during the past year in the number of horses affected with that loathsome and fatal disease of glanders. In 1893 but twenty-two horses were found affected which were condemned and destroyed at an appraisal of $995. In 1894 sixty-four have been condemned at an appraisal of $2,692.50, and the average number destroyed for the past five years is less than fifteen, while the facts of a year ago are reflected in our present report that but a very limited number of the horses destroyed were bred in Maine, the great majority of these being Western horses purchased in the Boston market and brought here by the car load to be disposed of by auction and by private sale. Among those destroyed, nine of the number were not appraised, as not having been owned in Maine the required time under the amended law of 1892, while among cattle all were appraised excepting two against which the same objection existed.

It will be remembered that our Board quarantined this State in 1888 against Texas mustangs, or bronco horses brought into Maine, and sold, to the number of 2,900, during the season of 1887, and among which thirteen cases of glanders were found in a single drove. Since that time no more bronchos have been brought here, but their places have been more than supplied by whole car loads of Western horses, that for various causes are cheaper than ever before, and all of which have been exposed to glanders before coming into Maine, the disease being more prevalent among horses of their class than any other. We believe that some proper restraint other than at present existing, should be placed upon the wholesale introduction of these horses, although a quarantine may not be advisable, as we have honorable dealers in various parts of Maine who are especially fitted up for dealing in workers and business horses of this class for which the demand seems to exceed the supply among Maine bred horses. The present hardship to such dealers seems to be that outsiders can bring the same class of horses into Maine and sell them by the car load at auction in cities and towns where they pay no rent and no taxes.

THOMAS DAGGETT,
F. O. BEAL,
GEORGE H. BAILEY, D. V. S.,
State Veterinary Surgeon.

ANNUAL REPORT

OF THE

Maine State College

Agricultural Experiment Station.

1894.

MAINE STATE COLLEGE.

AGRICULTURAL EXPERIMENT STATION.

THE STATION COUNCIL.

THE STATION STAFF.

THE PRESIDENT.

WHITMAN H. JORDAN, M. S............................Director

WALTER BALENTINE, M. S*...................... Agriculturist

JAMES M. BARTLETT, M. S ....Chemist

FRANCIS L. HARVEY, PH. D ....Botanist and Entomologist

LUCIUS H. MERRILL, B. S ....Chemist

FREMONT L. RUSSELL, V. S........................Veterinarian

WELTON M. MUNSON, M. S ....Horticulturist

HARRIS P. GOULD, B. S ....Assistant in Horticulture

ANDREW M. SHAW...........Foreman in Experimental Agriculture

MRS. J. HAMLIN WAITT ....Clerk and Stenographer

*Died February 26, 1894.

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TREASURER'S REPORT.

The Maine Agricultural Experiment Station in account with the United States appropriation:

RECEIPTS.

From the Treasurer of the United States as per appropriation for the year ending June 30, 1894		$15,000 00

EXPENDITURES.

Botany and Entomology	$ 25 35	
Chemical Laboratory	215 13	
Expense Account	144 94	
Field and Feeding Experiments	757 04	
Horticultural Department	925 92	
Meteorology	107 02	
Printing	1,397 65	
Construction and Repairs	749 19	
Stationery and Postage	160 80	
Traveling Expenses	226 34	
Library	226 99	
Veterinary Science	52 26	
Fuel	94 40	
World's Fair	16 06	
Heating Apparatus	1,020 91	
Water Supply	150 00	
Salaries	8,730 00	
		$15,000 00

I hereby certify that the above is a correct statement of the amount expended by the Maine Experiment Station for the year ending June 30, 1894.

G. H. HAMLIN, Treasurer,

Trustees of Maine State College of Agr. and the Mech. Arts.

I hereby certify that I have examined the accounts of the Maine Experiment Station for the fiscal year ending June 30, 1894; that I have found the above to be a correct statement of expenditures both as to amount and classification, for all of which, proper vouchers are on file.

HENRY LORD, Auditor,

Trustees of Maine State College of Agr. and the Mech. Arts.

DIRECTOR'S REPORT.

A. W. Harris, D. Sc., President Maine State College.

SIR:—I have the honor to submit herewith the report of the work performed by the members of the Experiment Station Staff during the year 1894.

It will be observed that the size of our report for 1894 is no larger and perhaps not so large as those of some previous years. This fact calls for explanation. It is due to several reasons.

1st. All of the work performed in 1894 is not reported. None of the data resulting from the investigations now being conducted in the line of plant nutrition have been published since those secured in the spring of 1893. As this work has consumed much time both in the laboratory and forcing house, its omission from the report has quite a material effect upon its size. Again, an experiment in animal nutrition which has now been continued for over eighteen months has received no mention. The object in withholding these data is that more completeness and definiteness may be secured in the conclusions which we hope to reach.

2nd. The data of our experiments and investigations are not published with that fullness of detail that is sometimes the practice. These details have a permanent record; but it is deemed wise not to confuse those who consult our reports with a large mass of figures and observations that serve to bewilder the reader.

3rd. Considerable of the time of one of the Station chemists was occupied with analyses of samples of suspected butter as an aid to the attempt made by Secretary McKeen to prevent the illegal sale of imitation butter. The attendance of myself and Mr. Bartlett was also required at court several times. The results so far secured seem to have justified the aid given. It is plain that the dairy interests of the State have in this way been materially aided.

REARRANGEMENT OF DUTIES.

The death of Professor Walter Balentine, who had the immediate charge of certain lines of Station work, and the consequent election of myself to the position which he occupied, have led to a partial rearrangement of the duties of some members of the Station Staff. I have undertaken the supervision of the field experiments which were under Professor Balentine's care, and the duties of the Station chemists, Mr. Bartlett and Mr. Merrill, have been enlarged by associating them with the immediate care of the experiments and investigations in plant and animal nutrition, work that previously was entirely superintended by Professor Balentine and myself.

SCOPE OF STATION WORK.

In order that the numerous directions along which the activities of the Station Staff are employed may be clearly seen, I summarize below the lines of work to which we are giving attention.

I. Experiments and investigations.
- (a) in plant nutrition,
  - (1) Forcing house experiments,
  - (2) Field experiments.
- (b) in animal nutrition,
  - (1) Digestion experiments,
  - (2) Animal growth,
  - (3) Milk production.
- (c) in horticulture,
  - (1) Plant breeding,
  - (2) Cultural experiments,
  - (3) Prevention of plant diseases and pests.
- (d) in economic botany and entomology,
  - (1) Weed pests,
  - (2) Injurious fungi,
  - (3) Injurious insects.
- (e) Bacteriology and veterinary science.

II. Creamery management.

III. Work of inspection.
- (a) Official fertilizer control.
- (b) Inspection of butter samples.

IV. Special analyses.

V. Correspondence.

VI. Institute work.

CORRESPONDENCE.

The amount of correspondence is steadily increasing year by year, and a large amount of time must be used in giving careful replies to the numerous inquiries which we receive concerning a great variety of subjects. The correspondents of the Station do not always receive prompt attention because of the absence at institutes or other work of the person who can give the desired information.

SPECIAL ANALYSES.

Very many requests are made each year to have analyses made of fertilizers, foods, minerals, drinking waters, etc., etc. Some of these requests are granted and others are refused. The reasons for the refusals are various. Sometimes the desired information can be given without analysis. The samples of fertilizers are often from those brands that have had recent inspection and additional analyses are not necessary. Examinations of drinking water are invariably refused as they are not considered as coming properly within the scope of our work. Besides being time-consuming, a mere chemical analysis of a drinking water settles nothing as to its healthfulness, in most cases, and with the additional bacteriological tests which are necessary in order that the results may have a definite value, would seriously interfere with duties that are mandatory.

INSTITUTE WORK.

The members of the Station Staff have freely participated in the institutes held under the auspices of the Board of Agriculture. While this work requires something of a sacrifice of effort, especially on my own part, it is felt to be necessary and profitable. Moreover, a failure to aid in these institutes to the extent that is acceptable would be a poor return for the cordial and helpful attitude which the Secretary of the Board and his associates have taken towards the Station.

PUBLICATIONS.

During the year the Station has issued eleven bulletins, two of which were reports of the inspection of fertilizers, and the others summarized briefly such reports of Station work as admitted of reliable conclusions. Ten thousand of each bulletin are now printed, nearly all of which are distributed in Maine.

Respectfully submitted,

W. H. JORDAN, *Director*.

MAINE STATE COLLEGE,
ORONO, ME., December 31, 1894.

ACKNOWLEDGMENTS.

Acknowledgment is hereby made for the following gifts to the Station:

One Wagner's Dairy Pipette.

As the result of a correspondence with Mr. Bartlett several firms presented to the Station Babcock Milk Testing Machines. These have been placed in the Dairy Building in order that dairy students may have access to them.

Steam Turbine Tester, Stoddard Manufacturing Co., Rutland, Vt.

Two Ten Bottle Hand Machines, Vermont Farm Machine Co., Bellows Falls, Vt.

One Ten Bottle Hand Machine, Cornish, Curtis & Greene, Fort Atkinson, Wis.

The following donations have been made to the Horticultural Department, 1894.

J. J. H. Gregory & Son, Marblehead, Mass., vegetable seeds.

Charles A. Miller, East Union, Me., apple cions.

John Nichols, North Searsport, Me., apple cions.

Division of Pomology, Washington, D. C., apple cions.

R. C. Buckley, Peoria, Ill., Buckley Wheel hoe.

Lucian Saunderson, New Haven, Conn., Comet Bug Killer.

The following newspapers and other publications are kindly donated to the Station by the publishers during 1894:

Farmers' Home, Dayton, Ohio.

Holstein Friesian Register, Boston, Mass.

Farm and Home, Springfield, Mass.

Jersey Bulletin, Indianapolis, Ind.

Farmers' Advocate, London, Ont.

Maine Farmer, Augusta, Maine.

Southern Cultivator, Atlanta, Ga.

American Dairyman, New York, N. Y.

The Sun, Baltimore, Md.
Massachusetts Ploughman, Boston, Mass.
Practical Farmer. Philadelphia, Pa.
New England Farmer, Boston, Mass.
Louisiana Planter, New Orleans, La.
Mirror and Farmer, Manchester, N. H.
Texas Farmer, Dallas, Texas.
Hoard's Dairyman, Fort Atkinson, Wis.
Detroit Free Press, Detroit, Mich.
Orange County Farmer, Port Jervis, N. Y.
Farm Journal, Philadelphia, Pa.
Delaware Farm and Home, Wilmington, Del.
American Cultivator, Boston, Mass.
Farmers' Review, Chicago, Ill.
The Rural Canadian, Toronto, Ont.
Vick's Magazine, Rochester, N. Y.
The Farm and Dairy, Ames, Iowa.
The Clover Leaf, South Bend, Ind.
The Grange Visitor, Lansing, Mich.
The Industrial American, Lexington, Ky.
The American Grange Bulletin and Scientific Farmer, Cincinnati, Ohio.
Agricultural Epitomist, Indianapolis, Ind.
Northern Leader, Fort Fairfield, Me.
American Agriculturist, New York.
American Creamery, Chicago, Ill.
Vermont Farmers' Advocate, Burlington, Vt.
The Farmers' Magazine, Springfield, Ill.
The Dairy World, Chicago, Ill.
The Rural New Yorker, New York, N. Y.
The Homestead, Des Moines, Iowa.
Turf, Farm & Home, Waterville, Me.
The Elgin Daily Reporter, Elgin, Ill.
The Dairy Messenger, Winnetka, Ill.

PARTIAL REPORTS OF THE CHEMISTS.

ANALYSIS OF BUTTER AND IMITATION BUTTER.

J. M. BARTLETT.

The following work on butter and imitation butters was performed for the Secretary of the Board of Agriculture to assist him in enforcing the oleomargarine law for the protection of the dairy industry.

The samples were taken by himself or his agent and then turned over to the Station for analysis. As some creameries were accused of mixing butterine or oleo with their product, a few samples of their goods were taken from the open market for examination but no adulteration was detected. Several of the parties selling the imitation article illegally were prosecuted, brought to trial and convicted. These trials necessitated the chemist spending several days at court. The results of the analysis are shown in the following table.

In most of the samples only the volatile fatty acids were determined, those being the only ingredients present in fats of the butters or butterines, that vary sufficiently to show the source from which the fat is derived. The results for volatile fatty acids are expressed in cubic centimeters of one-tenth normal alkali. Those contained in five grams of pure fat from milk or cream requires 25. to 34. c. c. one-tenth normal alkali to neutralize them, while those from other sources, such as lard, tallow, etc., require less than 4 c. c. The melting points are of considerable interest and it will be seen that with the exception of three or four samples, butterine has no higher melting point than good creamery butter.

Laboratory number.		Water.	Salt and ash.	Caseine and other organic matter.	Fat.	Volatile fatty acids.	Melting point c.
						c. c.	
	S. B. Creamery butter	12.1	2.63	.95	84.32	31 35	34.6
	F. C. Creamery butter	12.3	1.93	.93	84.84	30.8	34.2
	L	12.6	4.35	.98	82.07	32.78	34.4
401	XX. Imitation butter	9.06	3.15	.66	87.13	0.8	35.25
402	000	11.46	4.50	1.05	82.99	1.5	34.4
403	L. & W	10.85	4.49	1.12	83.54	1.25	33.1
404	XXX	9.44	3.25	.69	86.62	1.45	34.8
405	10 lbs	7.9	4.3	1.6	86.2	1.5	36.8
406	K. B	9.5	4.30	.98	85.22	1.6	
407	B. B. Dairy butter	–	–	–	–	31.25	
408	c. c. Dairy butter	–	–	–	–	31.4	
409	230T	6.9	3.37	0.9	88.83	1.4	34.0
410	A. A	–	–	–	–	1.1	36.0
411	19a	–	–	–	–	1.4	33.5
412	37c	10.9	3.43	0.95	84.72	0.85	34.3
413	11L	–	–	–	–	1.6	33.0
414	130L	7.48	3.49	0.79	88.24	1.26	34.3
415	146W. T	–	–	–	–	0.7	34.8
416	222	–	–	–	–	1.35	31.2
417	H. R	–	–	–	–	.85	34.8
418	s. o. p	–	–	–	–	0.1	37.2
419	a. e. g. Dairy butter	–	–	–	–	26.5	

MISCELLANEOUS ANALYSES.

L. H. Merrill.

In addition to the analytical work attending the fertilizer inspection, in which the writer has had part, he has had charge, during the past year, of the box experiments carried on in the forcing-house. The results of this work will be published later. The following analyses of fodders, Paris green and miscellaneous samples may be given here.

DATA RELATING TO DIGESTION EXPERIMENTS.—COMPOSITION OF FOODS.

	Water.	Ash.	Protein.	Fibre.	Nitrogen free extract.	Fat.
CCLXIII Hay, fed alone	5.80	4.87	7.00	30.85	48.61	2.87
CCLXIV Hay fed with Southern corn silage	6.15	5.04	7.06	30.31	48.39	3.05
CLXV Hay fed with field corn silage	5.62	4.91	7.18	30.37	48.97	2.95
CCLXVI Southern corn silage fed alone*	5.68	7.97	10.56	29.03	43.51	3.25
CCLXVII Southern corn silage fed with hay*	6.15	7.74	10.44	28.67	42.65	4.35
CCLXVIII Field corn silage fed with hay*	7.45	5.42	11.12	20.45	50.98	4.58
CCLXXVIII Corn meal, Maine grown	20.09	1.33	10.00	1.57	65.19	1.82
CCLXXIX Cotton seed meal	11.73	7.41	45.81	5.62	17.06	12.37
CCLXXX Cob meal	19.81	1.49	10.00	7.82	59.88	1.00
CCLXXXI Field corn silage fed alone*	5.91	5.17	11.25	20.56	51.50	5.61

*Air-dry.

COMPOSITION OF THE FECES.*

Sheep Experiments.	Water.	Ash.	Protein.	Fiber.	Nitrogen free extract.	Fat.
CCLI Sheep 1, hay alone	5.53	7.51	7.94	34.78	41.31	2.93
CCLII Sheep 3, hay alone	5.54	7.41	8.50	33.38	41.63	3.54
CCLIII Sheep 4, hay alone	5.63	7.30	8.45	34.66	41.00	2.96
CCLIV Sheep 1, Southern corn silage	5.47	10.78	12.00	25.87	42.93	2.95
CCLV Sheep 3, Southern corn silage	5.17	11.20	11.81	26.13	42.72	2.97
CCLVI Sheep 4, Southern corn silage	5.06	11.15	11.19	26.17	43.73	2.70
CCLVII Sheep 1, Southern corn silage and hay	5.57	9.21	9.06	30.54	42.40	3.14
CCLVIII Sheep 3, Southern corn silage and hay	5.45	9.13	10.00	30.36	41.94	3.12
CCLIX Sheep 4, Southern corn silage and hay	5.04	9.00	9.62	31.75	41.65	2.94
CCLX Sheep 1, field corn silage and hay	4.78	9.13	10.75	29.87	42.70	9.77
CCLXI Sheep 3, field corn silage and hay	4.60	9.85	11.69	28.15	42.24	3.47
CCLXII Sheep 4, field corn silage and hay	4.02	9.40	11.19	30.00	42.33	3.06
CCLXXXII Sheep 1, field corn silage	4.50	12.44	14.44	18.39	47.56	2.62
CCLXXXIII Sheep 3, field corn silage	3.87	13.33	16.81	18.26	44.34	3.39
CCLXXXIV Sheep 4, field corn silage	3.66	13.61	15.00	19.24	45.42	3.07

*Air-dry.

PARIS GREEN.

Five samples were examined.

CCLXXXVI. Strictly pure Paris green. Boston Color Co. Sent by John Watson, Houlton.

CCLXXXVII. English pure Paris green. Liverpool Paint and Color Co. Sent by John Watson.

CCLXXXVIII. Strictly pure Paris green. Canada Paint Co. Sent by John Watson.

CCLXXXIX. Strictly pure Paris green. James I. Blanchard. Purchased from Merrill and Nichols, Orono.

CCCII. A sample forwarded by Fred S. Wiggin, Maysville Center. The manufacturer's name was not given.

As the efficiency of Paris green is dependent upon the amount of arsenious acid present, no other ingredient was determined.

CCLXXXVI,	arsenious acid,	54.61 per cent.
CCLXXXVII,	" "	55.39 " "
CCLXXXVIII,	" "	54.70 " "
CCLXXXIX,	" "	55.84 " "
CCCII,	" "	40.86 " "

The amount of arsenious acid in a good Paris green is somewhat variable ranging from 54 to 61 per cent. The three samples sent by Mr. Watson were reported as failing to give satisfactory results, and adulteration was suspected. As will be seen, however, they all proved good.

SUNDRY ANALYSES.

CCL. Wood Ashes. From B. W. McKeen. Potash 7.82 per cent.

CCCXCIV. Marl. From C. Fred Ames, Fort Fairfield. Carbonate of lime, 83.22 per cent.

CCCXCV. Soil from J. D. Millikin, Scarboro. Water, 40.65. Nitrogen, 1.45. Potash, 0.14. Phosphoric acid, 0.17 per cent.

CCCXCVII and CCCXCVIII. Rock dust. From Maine Red Granite Co., Red Beach, Me.

CCCXCVII. Potash, 4.31 per cent. Phosphoric acid, 0.41 per cent.

CCCXCVIII. Potash, 3.18 per cent. Phosphoric acid, 0.19 per cent.

FIELD EXPERIMENTS WITH FERTILIZERS.

W. H. JORDAN.

One of the oldest, and evidently one of the most popular, classes of experiments conducted by experiment stations is field experiments in the use of fertilizers. The Maine Station has shared with other stations in this work and is now tilling experimental plots for the eleventh season.

After experience for this length of time, the writer is obliged to confess that the results obtained, although valuable enough to be well worth securing, are not so satisfactory as are those obtained along some other lines by more accurate and severe methods. Field experiments of whatever kind are not subject to exact control. They are widely open to sources of error, and for this reason they are difficult of safe interpretation. The publication of a single season's results is justified only on the ground of a pardonable ambition to show what and how much a station is trying to accomplish, but to draw hard and fast conclusions from one year's results is rarely warranted. After ten years have elapsed, however, the accumulated data possess a significance not possible in the early stages of the work. There are presented here therefore, not only the unpublished data of several years work but also a summary of results secured during nine years.

The problems that have been studied through field experiments with fertilizers are those that are plainly indicated by practical work as the important ones.

(1) The relative utility of different forms of phosphoric acid.

(2) The effect of partial and complete fertilizers.*

(3) The relative effect of different amounts of fertilizer.

(4) The possibility of maintaining fertility by the use of commercial fertilizers alone. (Systems of manuring.)

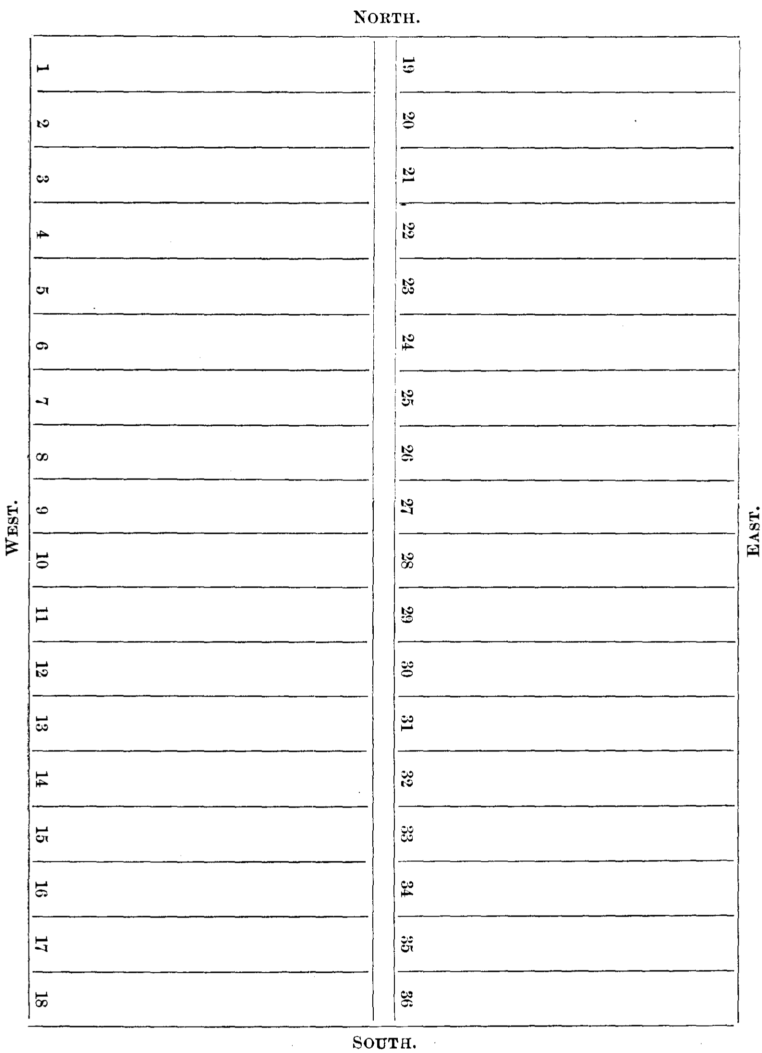
The matter of profit is not immediately connected with these experiments. Indeed it is not possible to order them with reference to profit, consequently in their discussion the cost of production is not considered

*The term complete is used here as meaning a fertilizer that contains nitrogen, phosphoric acid and potash. Such a fertilizer mixed in a particular manner, may or may not be complete in the sense of supplying the needs of a crop under given conditions.

These experiments involve the use of about twelve acres of land, nearly two acres (Field No. 1) of which are divided into thirty-six plots each 8x1 rods, containing one-twentieth of an acre, and ten acres (Field No. 2) divided into four plots, each two and one-half acres in area. The manner of treating the plots has been described in several previous reports of the Station but is restated in this connection for convenience of reference.

The diagram of field No. I is as follows:

DIAGRAM OF EXPERIMENTAL FIELD NO. 1.



While these plots appear to lie with their side boundaries in contact, there is really a strip of land eight feet wide separating them. This strip gives an opportunity for a ditch that secures surface drainage, and also prevents the fertilizer applied to any plot from having an influence upon those plots adjoining.

Of these thirty-six plots, six have been cropped without the addition of any fertilizer whatever. The remaining thirty plots have been occupied with ten methods of treatment, three plots being treated in the same manner in each case.

The quantities of fertilizers given in the table below are those applied in a single year.**

Plot 1 " 7 " 13	Received no fertilizer.
Plot 2 " 8 " 14	Dissolved bone black, 400* lbs. per acre. Muriate of potash, 100 lbs. per acre. Sulphate of ammonia,¶ 200 lbs. per acre.
Plot 3 " 9 " 15	Fine ground bone, 360 lbs. per acre. Muriate of potash, 100 lbs. per acre. Sulphate of ammonia,¶ 140 lbs. per acre.
Plot 4 " 10 " 16	Fine ground South Carolina rock, 300 lbs. per acre. Muriate of potash, 100 lbs. per acre. Sulphate of ammonia,¶ 200* lbs. per acre.
Plot 5 " 11 " 17	Muriate of potash, 100 lbs. per acre. Sulphate of ammonia, 200 lbs. per acre.
Plot 6 " 12 " 18	Stable manure, 40,000 lbs. per acre.
Plot 19 " 25 " 31	Received no fertilizer.
Plot 20 " 26 " 32	Dissolved bone black, 400* lbs. per acre.
Plot 21 " 27 " 33	Dissolved bone black, 400* lbs. per acre. Muriate of potash, 100 lbs. per acre.
Plot 22 " 28 " 34	Dissolved bone black, 200† lbs. per acre. Muriate of potash, 50 lbs. per acre. Sulphate of ammonia,¶ 60 lbs. per acre.
Plot 23 " 29 " 35	Dissolved bone black, 300‡ lbs. per acre. Muriate of potash, 100 lbs. per acre. Sulphate of ammonia,¶ 120 lbs. per acre.
Plot 24 " 30 " 36	Dissolved bone black, 400* lbs. per acre. Muriate of potash, 150 lbs. per acre. Sulphate of ammonia,¶ 180 lbs. per acre.

**Dissolved bone black was used as one source of phosphoric acid from 1886 to 1889 inclusive, after which dissolved South Carolina rock was used instead.

*Or dissolved South Carolina rock, 500 lbs.

†Or dissolved South Carolina rock, 250 lbs.

‡Or dissolved South Carolina rock, 375.

¶ Or nitrate of soda.

The history of these plots is summarized below.

Year.	Crop.	Treatment.
1886,	Oats,	Fertilizers applied.
1887,	Oats,	Fertilizers applied.
1888,	Hay,	No fertilizers.
1889,	Fallowed,	Fertilizers applied.
1890,	Peas,	No fertilizers.
1891,	Oats,	No fertilizers.
1892,	Peas,	No fertilizers.
1893,	Corn,	Fertilizers applied.
1894,	Corn,	Fertilizers applied.

It appears then that in nine years five applications of fertilizer have been made and eight crops produced.

Since 1891 no statement of the crops grown has been published. In order that these results may have a permanent record the yields from these plots in 1892, 1893 and 1894 are given in Table 1, after which the production for the nine years is condensed in a proper form for comparison.

TABLE I.

FERTILIZERS APPLIED PER ACRE AND YIELD PER PLOT, 1892, 1893, 1894.

	Fertilizers as applied in 1886, 1887, 1889, 1893 and 1894. None used in 1888, 1890, 1891 and 1892.	1892. Crop, Peas. Grain.	Straw.	Total.	1893. Crop, corn, green weight.	1894. Crop, corn, green weight.
Plot 1	No manure.	15.5	22.5	37	80	200
Plot 7		8.5	16.5	25	100	175
Plot 13		12	17	29	70	150
Plot 2	Fertilizer from 400 lbs. dissolved bone black,* 100 lbs. muriate of potash and 200 lbs. sulphate of ammonia,† mixed.	19	9	28	225	605
Plot 8		21	8.5	29.5	350	600
Plot 14		16.7	10.3	27	295	600
Plot 3	Fertilizer from 360 lbs. ground bone, 100 lbs. muriate of potash and 200 lbs. sulphate of ammonia,† mixed.	13.5	9.5	23	305	660
Plot 9		21.7	9.8	31.5	315	560
Plot 15		17	9	26	280	680
Plot 4	Fertilizer from 300 lbs. fine ground South Carolina rock, 100 lbs. muriate of potash and 200 lbs. sulphate of ammonia,† mixed.	14.7	9.3	24	175	480
Plot 10		16.5	6	22.5	330	400
Plot 16		10.3	7.7	18	200	685
Plot 5	Fertilizer from 100 lbs. muriate of potash, 200 lbs. sulphate of ammonia,† mixed.	15	10	25	175	430
Plot 11		23.5	13.5	37	205	350
Plot 17		17	9.5	26.5	225	500
Plot 6	Fertilizer, 40,000 lbs. stable manure.	26.5	9.5	36	490	890
Plot 12		22.5	17.5	40	460	780
Plot 18		55	17	72	650	850
Plot 19	No manure.	24.5	12	36.5	60	200
Plot 25		14.5	10.5	25	125	400
Plot 31		15	12	27	50	190
Plot 20	Fertilizer, consisting of 400 lbs. dissolved bone black alone.*	13.3	5.7	19	90	210
Plot 26		8	4.5	12.5	155	450
Plot 32		12	6.5	18.5	120	350
Plot 21	Fertilizer from 400 lbs. dissolved bone black,* 100 lbs. muriate of potash, mixed.	12.5	5.5	18	270	430
Plot 27		10	5	15	345	680
Plot 33		12.5	9.5	22	270	690
Plot 22	Fertilizer from 200 lbs. dissolved bone black,‡ 50 lbs. muriate of potash and 60 lbs. sulphate of ammonia,† mixed.	15	8	23	175	430
Plot 28		11	6.7	17.7	235	570
Plot 34		13	10	23	180	480
Plot 23	Fertilizer from 300 lbs. dissolved bone black,‖ 100 lbs. muriate of potash and 120 lbs. sulphate of ammonia,† mixed.	16.5	6.5	23	265	650
Plot 29		21.7	9.3	31	230	590
Plot 35		17.5	10.5	28	235	680
Plot 24	Fertilizer from 400 lbs. dissolved bone black,* 150 lbs. muriate of potash and 180 lbs. sulphate of ammonia,† mixed.	19.5	7.5	27	365	880
Plot 30		22.7	4.3	27	355	690
Plot 36		20.5	7	27.5	395	820

* Or 500 lbs. dissolved South Carolina rock.

‡ Or 250 lbs. dissolved South Carolina rock.

‖ Or 375 lbs. dissolved South Carolina rock.

† Or same weight nitrate of soda.

In 1893 fifty pounds of corn were selected from each plot, making 150 pounds for each set of three plots. This was stored in the barn for a time and was then weighed, chopped and sampled. The samples were dried in a closet heated by steam, and then after standing in the air of an ordinary room for several weeks were weighed. These weights were taken as those in the air dry condition. In 1894 practically the same course was pursued only the samples were selected for drying as the corn was chopped for the silo in the fresh green state. The moisture in the air-dry samples for 1894 was also determined in order to ascertain the yield of dry matter. (See Table 2.)

TABLE II.

	1893—Air dry material per cent from green corn.	1894.	
		Air dry material per cent from green corn.	Per cent of dry matter in green corn.
Plots 1, 7, 13	23.7	21.4	19.8
Plots 2, 8, 14	24.4	24.3	22.4
Plots 3, 9, 15	22.1	24.0	22.0
Plots 4, 10, 16	22.9	25.2	23.4
Plots 5, 11, 17	22.4	22.0	20.4
Plots 6, 12, 18	27.5	21.2	19.8
Plots 19, 25, 31	24.4	18.8	17.3
Plots 20, 26, 32	23.6	19.0	17.5
Plots 21, 27, 33	25.2	21.1	19.7
Plots 22, 28, 34	23.9	20.1	18.5
Plots 23, 29, 35	19.9	20.3	18.8
Plots 24, 30, 36	27.5	*21.5	*20.0

*Assumed.

By the use of the foregoing data the production of air dry material in the corn for the years 1893 and 1894 is calculated.

The succeeding table (Table 3) shows the yield of air dry material from the crops under consideration since the experiments were begun in 1886

The quantities stated represent the rate of production of per acre. The data for the years previous to 1892 have been copied from the reports of these experiments published up to that time.

TABLE III.

SUMMARY OF YIELD PER ACRE OF FIELD NO. 1, FOR EIGHT YEARS.

		No fertilizer. Plots 1, 7, 13.	Complete fertilizer, phosphoric acid from dissolved bone black. Plots 2, 8, 14.	Complete fertilizer, phosphoric acid from ground bone. Plots 3, 9, 15.	Complete fertilizer, phosphoric acid from crude South Carolina rock. Plots 4, 10, 16.	Only nitrogen and potash applied. Plots 5, 11, 17.	Stable manure. Plots 6, 12, 18.
1886, Oats	Grain	1,670	2,486	2,286	2,166	1,936	2,216
	Straw	1,994	3,414	3,134	2,886	2,564	3,050
	Total	3,664	5,900	5,420	5,052	4,500	5,266
1887, Oats	Grain	800	1,160	956	1,064	1,052	1,014
	Straw	1,200	2,240	1,610	2,036	1,648	2,060
	Total	2,000	3,400	2,566	3,100	2,700	3,074
1888, Hay		2,566	2,434	2,800	2,566	2,234	4,010
1889, Fallow							
1890, Peas	Grain	742	902	946	848	762	1,360
	Straw	664	948	976	914	660	1,284
	Total	1,406	1,850	1,922	1,762	1,422	2,644
1891, Oats	Grain	1,166	1,346	1,376	1,160	1,296	1,542
	Straw	726	986	1,090	776	704	1,746
	Total	1,892	2,332	2,466	1,936	2,000	3,288
1892, Peas	Grain	468	368	376	308	440	588
	Straw	748	756	696	552	740	1,388
	Total	1,216	1,124	1,072	860	1,180	1,976
1893, Corn	Green	1,666	5,800	6,000	4,700	4,040	10,660
	Air-dry	395	1,415	1,326	1,076	905	2,931
1894, Corn	Green	3,500	12,040	12,660	10,440	8,540	16,800
	Air-dry	749	2,926	3,038	2,631	1,879	3,562
	Dry matter	693	2,697	2,785	2,443	1,742	3,326
Total yield, 8 crops		13,888	21,381	20,610	18,983	16,820	26,751
Increase of yield over plots without fertilizer			7,331	6,560	4,933	2,770	12,701
Annual increase			916	820	617	346	1,588

TABLE III—CONTINUED.

		No fertilizer. Plots 19, 25, 31.	Phosphoric acid alone. Plots 20, 26, 32.	Phosphoric acid and potash. Plots 21, 27, 33.	Complete fertilizer, 360 lbs. per acre. Plots 22, 28, 34.	Complete fertilizer, 595 lbs. per acre. Plots 23, 29, 35.	Complete fertilizer, 830 lbs. per acre. Plots 24, 30, 36.
1886, Oats	Grain	1,574	1,656	1,630	1,726	2,070	2,040
	Straw	2,394	2,856	3,276	3,006	3,570	3,994
	Total	3,968	4,512	4,906	4,732	5,640	6,034
1887, Oats	Grain	846	870	732	900	858	1,214
	Straw	1,554	1,230	1,902	1,934	2,642	2,620
	Total	2,400	2,100	2,634	2,834	3,500	3,834
1888, Hay		1,634	2,166	2,066	2,166	1,766	2,374
1889, Fallow.							
1890, Peas	Grain	764	852	958	894	822	954
	Straw	854	922	1,020	844	872	824
	Total	1,618	1,774	1,978	1,738	1,694	1,778
1891, Oats	Grain	1,192	1,256	1,264	1,202	1,278	1,278
	Straw	876	1,410	1,404	1,294	1,422	1,388
	Total	2,068	2,666	2,668	2,496	2,700	2,666
1892, Peas	Grain	460	224	268	328	348	248
	Straw	720	444	468	520	744	836
	Total	1,180	668	736	848	1,092	1,084
1893, Corn	Green	1,500	2,440	5,900	3,940	4,860	7,440
	Air-dry	366	576	1,486	942	967	2,046
1894, Corn	Green	5,260	6,740	12,000	9,860	12,800	15,940
	Air-dry	978	1,280	2,532	1,982	2,598	3,427
	Dry matter	910	1,179	2,364	1,824	2,406	3,188
Total yield, 8 crops		14,212	15,742	19,006	17,738	19,957	23,243
Increase of yield over plots not fertilized			1,690	4,956	3,688	5,907	9,193
Annual increase			211	619	461	738	1,149

The previous tables present a statement of the production of the entire system of plots, without any special classification of the results with reference to the problems involved. Such a classification is necessary in order to discover more clearly the nature of the testimony offered.

THE RELATIVE UTILITY OF DIFFERENT FORMS OF PHOSPHORIC ACID.

Ever since commercial fertilizers have come into general use more or less discussion has been carried on as to the value of insoluble phosphates as a source of phosphoric acid. This discussion has been chiefly caused by the fact that phosphoric acid has cost much less in the crude condition than after treatment with sulphuric acid. It has been generally conceded that the less soluble and cheaper form of plant food is more likely to prove useful in grass and grain growing than with hoed crops, because in the first case permanency of effect is desired and in the latter, immediate availability is the essential thing.

It is true, however, that in later years we have come to more fully appreciate the ability of plants to make their own solutions of food from the minerals of the soil that are highly inert so far as it is a question of solution in water, and we have known for a long time that the water-soluble phosphates of fertilizers revert very rapidly after contact with the soil to these forms that are easily dissolved only by acids, the chief advantage secured by the manufacture of a superphosphate being that its compounds become distributed in the soil in a more finely divided condition than is possible in any other way and so become more fully accessible to root action. The results of these experiments are in accord with the tendency to accord to insoluble phosphates a larger place in practice. (See Table 4.)

TABLE IV.

	Yield per acre of air-dry crops.		
	Total yield in 8 years.	Total excess of yield over plots not fertilized.	Annual excess of yield over plots not fertilized
	lbs.	lbs.	lbs.
Plots receiving no fertilizer (average of 6)	14,050		
Complete fertilizer, phosphoric acid largely dissolved.	21,381	7,331	916
Complete fertilizer, phosphoric acid from ground bone,	20,610	6,560	820
Complete fertilizer, phosphoric acid from crude ground South Carolina rock	18,983	4,933	617
Fertilizer containing nitrogen and potash, but no phosphoric acid	16,820	2,770	346

We have in the above figures conclusive evidence that the phosphoric acid of the bone and ground South Carolina rock was quite freely appropriated, though not to the same extent as from the dissolved phosphate.

The quantities stated are the total crop harvested in eight years. Another arrangement of figures is necessary to show whether the increased yield occurred with all crops alike is only with certain ones. With the exception of the hay, only those crops are given in Table 5 which were the first ones grown after the application of the fertilizers.

TABLE V.

	Excess of yield over plots not fertilized.					
	Oats. 1886.	Oats. 1887.	Hay. 1888.	Peas. 1890.*	Corn. 1893.	Corn. 1894.†
Complete fertilizer, phosphoric acid dissolved	2,236	1,400	—132	444	1,020	2,004
Complete fertilizer, phosphoric acid from ground bone	1,756	566	234	516	931	2,092
Complete fertilizer, phosphoric acid from crude South Carolina rock	1,388	1,100	-	356	681	1,750
Nitrogen and potash without phosphoric acid	836	700	—332	16	510	1,049

* Fertilizers applied in 1889, and land summer fallowed.
† Yield of dry matter.

In the light of the facts here presented it is necessary to admit that the water-insoluble forms of phosphoric acid have been utilized by at least three species of farm crops.

THE EFFECT OF PARTIAL AND COMPLETE FERTILIZERS.

It has for some time been well enough established that under average conditions a complete fertilizer, viz: one containing compounds of nitrogen, phosphoric acid and potash causes a larger increase of crop than a fertilizer containing only one or two of these ingredients. It is equally plain that one ingredient often has a preponderating influence, and more often two of these ingredients combined are nearly as useful as the three. Unfortunately the results of experiments in a particular locality do not with any certainty apply to any other locality as indicating the special needs of the soil, and these experiments at the College were not undertaken with the idea of establishing formulæ of general use in the State.

It seemed desirable, however, to ascertain what would be the outcome of fertilizing continuously with partial fertilizers in a soil that has seemed to especially need the mineral ingredients. This can be seen in Table VI.

TABLE VI.

	Yield per acre of air-dry crops.		
	Total yield in 8 years.	Total increase of yield over plots not fertilized.	Annual increase of yield over plots not fertilized.
Plots receiving no fertilizer (average of 6)	14,050		
Fertilizer supplying only phosphoric acid	15,742	1,690	211
Fertilizer supplying phosphoric acid and potash	19,006	4,956	619
Fertilizer supplying nitrogen and potash	16,820	2,770	346
Fertilizer supplying nitrogen, phosphoric acid and potash	21,381	7,331	916

While there is certainly an increase of crop from every combination of ingredients used, there is no doubt of the superior influence of the mixture of the three.

THE RELATIVE EFFECT OF DIFFERENT AMOUNTS OF FERTILIZER.

One of the important considerations pertaining to the use of commercial fertilizers is the quantity to be applied. In these experiments the amount of complete fertilizer applied per acre on one set of three plots has been at the rate of 360 pounds per acre, on another set 595 pounds and on a third set 830 pounds. The results show that the increase of production has been almost directly proportional to the amount of fertilizer used.

TABLE VII.

	Total yield in 8 years.	Total increase of yield over plots not fertilized.	Increase of yield for each pound of fertilizer applied.
Plots receiving no fertilizer (average of 6)	14,050		
Plots receiving 360 lbs. fertilizer per acre	17,738	3,688	2.05
Plots receiving 595 lbs. fertilizer per acre	19,957	5,907	1.95
Plots receiving 830 lbs. fertilizer per acre	23,243	9,193	2.25

THE COMPARATIVE RESULTS WITH COMMERCIAL FERTILIZERS AND WITH STABLE MANURE.

The figures contained in the succeeding table should be suggestive to two classes of farmers: (1) Those who are skeptical about the real value of commercial manures for feeding plants, and (2) those who carelessly allow a waste of plant food from the stable which is no less valuable than that which is purchased.

TABLE VIII.

	Yield per acre of air-dry fodder.		
	Total yield in 8 years.	Total excess of yield over plots not fertilized.	Annual excess of yield over plots not fertilized.
Plots receiving no fertilizer	14,050		
Plots receiving 360 lbs. fertilizer per acre	17,738	3,688	461
Plots receiving 595 lbs. fertilizer per acre	19,957	5,907	738
Plots receiving 800 lbs. fertilizer per acre	21,381	7,331	916
Plots receiving 830 lbs. fertilizer per acre	23,243	9,193	1,149
Plots receiving 40,000 lbs. stable manure per acre	26,751	12,701	1,588

The fact of greater production from the stable manure than from the commercial fertilizers is what would reasonably be expected when we consider the larger amount of plant food contained in the former. If the stable manure was of average composition, and it was at least as rich as that, the quantities of plant food supplied would not be far from the following:

TABLE IX.

	Applied per acre.		
	Nitrogen —lbs.	Phosphoric acid—lbs.	Potash—lbs.
In 40,000 lbs. stable manure	196	128	176
In the largest amount commercial fertilizers	30 to 40	75	75

It seems quite evident that a larger percentage of the materials furnished by the commercial fertilizers has been appropriated by the growing crops than was the case with the stable manure. This may due, however, to the smaller supply from commercial sources.

SYSTEMS OF MANURING.

In 1888 this Station began a field experiment upon a somewhat large scale, which was designed for the purpose of securing information on two points of great practical interest:

1st. The possibility of maintaining soil fertility by the use of commercial fertilizers alone.

2nd. The comparative value for general farming of crude and dissolved phosphates.

This experiment was under the immediate direction of Professor Walter Balentine until his death in 1894 when it passed to the care of the writer. The data from four years work are given in the Station reports for 1890 and 1891 but for various reasons no report has been made of the results reached since the season of 1891, at which time the plot were sown to oats and seeded with timothy and clover. In reporting the additional data secured, it appears desirable to restate the plan and conditions of the experiment and summarize the seven years results.

The experimental field consists of ten acres, divided into four plots of two and one-half acres each. The treatment decided upon for each of these plots was as follows:

EXPERIMENTAL FIELD No. 2.

North.

No. 1. 20 loads ($6\frac{2}{3}$ cords) Stable Manure per acre.	$2\frac{1}{2}$ Acres.
No. 2. 1,000 lbs. South Carolina Rock, 66 lbs. nitrate of soda, 16 lbs. sulphate of ammonia, 100 lbs. muriate of potash per acre.	$2\frac{1}{2}$ Acres.
No. 3. 500 lbs. Acid South Carolina Rock, 66 lbs. nitrate of soda, 16 lbs. sulphate of ammonia, 100 lbs. muriate of potash per acre.	$2\frac{1}{2}$ Acres.
No. 4. No manure.	$2\frac{1}{2}$ Acres.

South.

In 1890 the fertilizers were applied, since which four crops have been grown. In 1891 the plots were sown to oats and seeded to clover, but this was all killed during the succeeding winter, so that the land was again plowed in the spring of 1892 and sown to barley, which was cut and cured for hay. During the summer of 1893 the plots were kept fallow and tilled as an attempt to eradicate certain most pernicious cruciferous weeds. In 1894 the land was again sown to oats, but as the crucifers were not all exterminated and it was desirable that they should not ripen and scatter their seeds, the oats were cut before maturing and used for silage.

Large samples (1,000 pounds from each plot) of the green oats were selected and cured, from which smaller samples of air-dry material were taken in order to determine the percentage of dry matter in the crop as cut.

TABLE X.

YIELD PER ACRE FOR THE YEARS 1888 TO 1894, INCLUSIVE.

	Plot 1. Barn manure.	Plot 2. Phosphoric acid, crude.	Plot 3. Dissolved phosphate.	Plot 4. Nothing.
	lbs.	lbs.	lbs.	lbs.
Hay, average yield 1888 and 1889	2,542	2,416	2,082	2,510
Barley and peas, combined yield, 1890*	2,208	1,712	1,422	1,118
Oats, 1891. Grain	1,536	1,447	1,523	1,304
Oats, 1891. Straw	2,282	1,534	1,449	1,176
Oats, 1891. Total	3,818	2,981	2,972	2,480
Barley hay, 1892	3,444	2,324	1,930	1,161
Summer tilled, 1893.				
Oats, 1894. Green crop	9,968	10,264	7,608	6,340
Oats, 1894. Dry matter	1,894	2,453	1,734	957.3
Yield without fertilizers as calculated from the relative production of 1888-1889	966	919	766	957.3
Gain caused by fertilizers in 1894	928	1,534	968	

*Fertilizers applied this year.

The plots have been treated during the seven years from 1888 to 1894 inclusive as shown by the summary given below:

Year.	Manuring.	Crop produced.
1888,	No fertilizer,	Grass.
1889,	No fertilizer,	Grass.
1890,	Fertilizer applied,	Peas and barley.
1891,	No fertilizer,	Oats, seeded down.
1892,	No fertilizer,	Barley, cut for hay.
1893,	No fertilizer,	Summer fallowed and tilled.
1894,	No fertilizer,	Oats, cut green for silo.

It seems that during seven years the plots have produced six crops, have received one application of the fertilizers and have been summer tilled once. Two years were allowed to elapse before any fertilizer was applied, during which time the grass crop was cut and the hay weighed, in order to ascertain the relative natural productiveness of the plots before receiving special treatment.

The above figures effectually answer the question so often proposed by farmers, "Do commercial fertilizers have influence upon more than the first crop succeeding their application?"

In this instance the fertilizers were applied in 1890 and at the end of the season of 1894 five crops of grain had been removed without any further manuring, but even after the growth of three previous crops the one of 1894 shows in a marked manner the influence of the fertilizers used in 1890. It is too early however, to reach any conclusion as to whether commercial fertilizers can be depended upon as a source of fertility for all time.

This experiment has already furnished a bit of not insignificant testimony on the use of raw ground mineral phosphates, for grain growing at least. Plots two and three were treated exactly alike excepting that the phosphoric acid applied to plot three was chiefly in the soluble and reverted form, while on plot two it was used in much larger quantities almost wholly in the insoluble form. In other words, an acid or soluble phosphate was used on plot three and a crude ground phosphate on plot two.

TABLE XI.

INGREDIENTS APPLIED IN COMMERCIAL FERTILIZERS ON PLOT TWO AND THREE.

	Plot 2—pounds.	Plot 3—pounds.
Phosphoric acid, mostly dissolved	-	80
Phosphoric acid, undissolved	250	
Potash	50	50
Nitrogen	14	14

With the exception of the oat crop of 1891 the production of plot two has largely exceeded that of plot three. Especially is this true of the 1894 crop after the exhausting effect of three years of cropping. In this year the greater productiveness of plot two is very marked, the excess of yield being 566 pounds of dry matter. This is certainly one instance of the unmistakable persistent influence of a crude phosphate in increasing the growth of a field crop.

In comparing the relative effect of the barn manure and the commercial fertilizers it is clearly seen that for the first three crops the former caused the greater increase of production. If we compare the plant food furnished to each of the several plots, this appears to be a most natural result as much the larger amount was applied to the barn manure plot.

TABLE XII.

PLANT FOOD SUPPLIED TO THE SEVERAL PLOTS.

	Nitrogen—pounds.	Phosphoric acid—pounds.	Potash—pounds.
Plot 1	172	116	176
Plot 2	14	250	50
Plot 3	14	80	50
Plot 4	0	0	0

Only in the case of the phosphoric acid of Plot 2 do the commercial manures exceed or even approach in quantity the plant food furnished by the stable manure. This greater amount of plant food does not fail of its effect, but it is worthy of remark that after three crops have been removed the yield of Plot 1 is inferior to that of Plot 2 and scarcely greater than that of Plot 3. A possible explanation of this is that the soil is especially lacking in available phosphoric acid and therefore the larger amount of this compound applied to Plot 2 resulted in a more persistent increase of crop. These results so far run counter to the prevailing views as to the relative permanence of effect of animal and commercial manures.

But the experiment is still in progress and definite conclusions should be withheld for some years.

The following, however, is a brief summary of the more important facts to date, as bearing upon the experiment on Field 2 :

(1) The commercial fertilizers have caused a marked increase of crop for at least four years after their application.

(2) The fourth crop was larger from the crude phosphate than from the dissolved.

(4) The first three crops were larger from the yard manure than from the commercial manures but the fourth crop was larger from the latter.

THE PROFITABLE AMOUNT OF SEED PER ACRE FOR CORN.

W. H. JORDAN.

The opinion has prevailed somewhat in the past, if a practice is any indication of an existing opinion, that the larger the amount of seed used the greater the yield of corn for soiling or fodder purposes.

In many instances not less than a bushel of corn has been sown per acre on the plot that was to furnish fodder corn in late August and during September. The resulting product has always been a large weight of immature, very watery fodder.

Possibly the practice was correct if we assume that the gross weight of a green crop is a correct measure of its value.

We know that this is not the case, but, that the value of any crop is chiefly measured by its yield of dry matter, and we have found out that the largest food product is obtained when the amount of seed approximates, at least, to that planted in ordinary field culture. More or less discussion still exists, however, in regard to the exact quantity of seed that is conducive to the maximum yield. A very common custom is to plant five kernels in a hill with the rows three and one-half feet apart and the hills three feet. This is nearly equivalent to rows the same distance with single kernels drilled in at a distance of seven inches apart.

During the past season an experiment has been carried on by the Station for the purpose of ascertaining the amount of seed most profitable in corn raising.

A plot of one acre was used for this purpose. This plot received five cords of manure and five hundred pounds of commercial fertilizer. It was divided into twelve plots, or four sets of plots with three plots in a set.

On one plot in each set the single kernels were planted six inches apart, on another nine inches, and on the third twelve inches. This gave four plots or one-third of an acre planted by each method. The corn was allowed to stand until the kernels glazed and was then cut, weighed and sampled.

Below can be seen the gross yield of crop per acre, the percentage and the total yield of dry matter.

TABLE XIII.

	Yield of green crop per acre.	Per cent of dry matter in green crop.	Yield of dry matter per acre.
Kernels 6 inches apart or 6 in three feet	21,315	21.1	4,497
Kernels 9 inches apart or 4 in three feet	22,530	20.9	4,709
Kernels 12 inches apart or 3 in three feet..................	20,190	20.5	4,139

In this instance at least the medium quantity of seed, viz: Four kernels in each three feet, produced the largest yield of both green crop and dry matter. Several similar trials will be made to determine whether this will uniformly occur.

It appears that the corn from the different quantities of seed was of practically uniform composition.

TABLE XIV.

	Water.	Ash.	Protein.	Fiber.	Nitrogen free-extract.	Fats.
Planted with kernels 6 inches apart....... ..	78.90	1.09	1.87	4.30	13.07	.76
Planted with kernels 9 inches apart...........	79.10	1.35	2.02	3.73	12.97	.83
Planted with kernels 12 inches apart..........	79.50	1.01	1.85	4.40	12.52	.72

DIGESTION EXPERIMENTS.

THE INFLUENCE OF FOOD COMBINATIONS UPON DIGESTIBILITY.

W. H. JORDAN.

A large amount of time has been expended in determining the digestibility of our various cattle foods, and the figures obtained are known as coefficients of digestibility. These coefficients are arranged in tables convenient for reference, and are much used in a practical way for the calculation of rations. In practice it is assumed that when the several materials in the ration are multiplied by their respective percentages of digestibility, the sum of the quantities thus obtained will represent very nearly the total digestible material fed; in other words, it is assumed that no matter how foods are combined, each food continues to have its peculiar rate of digestibility, which is not changed to any important extent by the influence of the foods which accompany it.

The correctness of the position is somewhat questioned by those familiar with related facts, their doubt being based not so much upon theoretical reasons as upon the apparent outcome of certain digestion experiments.

The digestibility of a food in a particuiar instance must be determined by two factors:

(1) What has been termed the "inherent resistance" of the food to the solvent action of the digestible liquids.

(2) The supply in abundance of these digestive fluids.

The writer has always inclined to the view that the first factor is so largely the controlling one that unless the animal is under abnormal conditions it almost wholly determines the amount of the food that shall pass into solution. To illustrate, egg albumen is wholly peptonized by the gastric juice, or starch is wholly inverted to glucose under the action of the pancreatic juice, and these results will always obtain when these two juices are secreted in proper abundance, not being influenced by the relative amounts present of other compounds that are to be digested. There is a possibility that a food may be so distasteful to the animal that the nerve stimulus necessary for the proper secretion of the digestive fluids may be wanting, and in such a case the addition to the ration of anything that would render it more palatable would promote digestibility, but with healthy animals judiciously fed on the ordinary food mixtures, we have no reason to suspect either unpalatableness or an insufficient supply of the digestive juices.

One difficulty in obtaining conclusive testimony on the point under consideration lies in the limitations of digestion experiments, which with ruminants, at least, do not allow the determination of the digestibility of all foods as fed singly.

The co-efficients of digestibility of grains with ruminants have been reached by assuming coarse fodders to have the same digestibility when fed with them as when fed alone. We do not know how much of the grains would be digested when not accompanied by any other food, nor do we know if hay maintains the same digestibility when grains are combined with it. The way by which we can get at the most reliable figures is to experiment with foods that it is practicable to feed both singly and combined.

The digestion experiments at this Station in 1894 have been directed toward gaining information on the points under consideration.

The experimental foods have been Timothy hay and silage. If combination does affect digestibility, it would be likely to occur when two such foods as these are mixed,—the one coarse, dry, quite indigestible and not highly palatable, and the other succulent, much more digestible and very much relished by the animals.

The experiments were conducted with the foods alone and combined, using Timothy hay, silage from the large immature Southern corn and silage from mature Flint corn. The following is a summary of the results :

	Coefficients of digestibility.						
	Dry matter.	Ash.	Organic substance.	Protein.	Fiber.	Nitrogen free-extract.	Fat.
Timothy hay, 600 grs. daily, Sheep 1	54.4	28.8	55.7	48.2	48.7	61.3	57.2
Sheep 2......	52.7	28.2	54	42.7	48.9	59.6	41.8
Sheep 3......	54.1	31.3	55.3	44.7	48.5	61.2	52.7
Average	53.7	29.4	55	45.2	48.7	60.7	50.6
Silage, Southern corn, 2,000 grs. daily. Sheep 1......	64.6	52.3	65.7	59.8	68.5	65.1	67.8
Silage, Southern corn, *2,500 grs. daily. Sheep 2	64.5	50	65.8	60.4	68.2	65.3	67.6
Silage, Southern corn, 2,500 grs. daily. Sheep 3......	61.8	46.5	63.1	59.7	65.8	61.8	68.4
Average	63.6	49.6	64.8	59.9	67.5	64.1	67.9
Silage, Maine Flint corn, 2,000 grs. daily. Sheep 1......	75.1	41	77.2	68.5	78.1	77.4	88.5
Sheep 2......	76	39.4	78.2	64.9	79.2	79.8	85.8
Sheep 3......	76.2	39	78.4	68.9	78.2	79.5	87.2
Average	75.7	39.8	77.9	67.4	78.5	78.9	87.1
Combination Southern corn silage and hay. Sheep 1......	55.1	30.6	56.8	50.9	54.2	59.3	59
Sheep 2......	58.9	38.4	60.3	52	56	62.9	64.4
Sheep 3......	57	37.4	58.4	51.4	53.9	61.7	65
Average	57	35.6	58.5	51.4	54.7	61.3	62.8
Combination field corn silage and hay. Sheep 1......	73.6	49	74.8	68.6	70.3	77.8	80.4
Sheep 2......	66.4	-	68.1	56.7	64.4	72.1	68.7
Sheep 3......	67.1	-	68.6	59.6	63.1	72.7	73.2
Average sheep 2 and 3	66.7	-	68.3	58.1	63.7	72.4	70.9

* For analyses of materials see report of L. H. Merrill.

It will be observed that the digestibility of both the hay and the silages was determined with these foods when eaten alone.

Having these figures it is possible to calculate the digestibility of a known mixture of hay and silage, assuming that the one has no influence on the other. But this is the point in question and in Tables XV and XVI we have a comparison of the theoretical digestibility with what actually occurred.

TABLE XV.

COMBINATION OF HAY AND SOUTHERN CORN SILAGE.

SHEEP 1.	Dry matter.	Ash.	Organic matter.	Protein.	Fiber.	Nitrogen free-extract.	Fats.
Dry matter eaten	2,005	127.4	1,877.4	175.6	635	992.1	74.7
Dry matter actually digested	1,106	39	1,066.8	89.4	344.3	588.3	44.9
Amount digested as calculated from results with foods fed singly	1,161	-	1,099.1	93.5	350.9	620.1	46.1
Per cent actually digested	55.1	30.6	56.8	50.9	54.2	59.3	59
Per cent digested as per calculation	57.9	-	58.5	53.2	55.2	62.5	61.7
SHEEP 2.							
Dry matter eaten	2,177.5	141.6	2,035.7	194.8	687.6	1,070.6	82.6
Dry matter actually digested	1,282.4	55.2	1,227	100.2	400.3	673.3	53.2
Amount digested as calculated from results with foods fed singly	1,249.4	-	1,192.8	100	387	660.5	44.8
Per cent actually digested	58.9	-	60.3	52	58.2	62.9	64.4
Per cent digested as per calculation	57.4	-	58.6	52	56.4	61.7	54.2
SHEEP 3.							
Dry matter eaten—same as Sheep 2							
Dry matter actually digested	1,241.7	53	1,188.5	100	374.8	659.9	53.7
Amount digested as calculated from results with foods fed singly	1,244.4	-	1,187.5	101.5	379	657.6	49.8
Per cent actually digested	57	-	58.4	51.4	53.9	61.7	65
Per cent digested as per calculation	57.1	-	58.3	52.1	55.1	61.4	60.3
Average per cent actually digested	57	-	58.5	51.4	55.4	61.3	62.8
Average per cent digested as per calculation	57.4	-	58.5	52.4	55.5	61.9	58.7

TABLE XVI.

COMBINATION OF HAY AND FIELD CORN SILAGE.

SHEEP 1.	Dry matter.	Ash.	Organic matter.	Protein.	Fiber.	Nitrogen free-extract.	Fat.
Dry matter eaten................	2,297	115.8	2,171.1	218.1	639.5	1,223.7	89.7
Amount actually digested.........	1,690.5	57	1,623.4	149.6	449.2	952.3	72.1
Amount digested as calculated from results with foods fed singly...........................	1,454	-	1,409	129.2	375.5	837.7	66.6
Per cent actually digested*	73.6	49	74.8	68.6	70.3	77.8	80.4
Per cent digested as per calculation..............................	63.3	-	64.9	59.2	58.7	68.5	74.2
SHEEP 2.							
Total fed—same as Sheep 1.							
Amount actually digested.........	1,525.2	36.2	1,479	123.6	411.8	881.9	61.6
Amount digested as calculated from results with foods fed singly.............................	1,440.6	-	1,397 3	119.4	378.8	839.2	59
Per cent actually digested.........	66.4	-	68.1	56.7	64.4	72.1	68.7
Per cent digested as per calculation.............................	62.7	-	64.3	54.8	59.2	68.6	65.8
SHEEP 3.							
Total fed—same as Sheep 1.							
Amount actually digested....	1,540.7	-	1,488.8	130	403.2	890	65.6
Amount digested as calculated from results with foods fed singly.............................	1,460.6	-	1,415.1	126.2	374.9	848.4	64.1
Per cent actually digested.........	67.1	-	68.6	59.6	63.1	72.7	73.2
Per cent digested as per calculation......	63.6	-	65.1	57.9	58.6	69.4	71.5
Average per ct. actually digested†	66.7	-	68.3	58.1	63.7	72.4	70.9
Average per cent digested as per calculation†......................	63.1	-	64.7	56.3	58.9	69	68.6

* These coefficients are evidently too high.

† Average to Sheep 2 and 3.

The outcome of these experiments does not give quite so definite testimony as is desirable. In the case of the hay and southern corn silage combination the calculated and the actual digestibility agree very closely, while with the hay and field corn silage the actual digestibility is about 3.5 per cent greater than the calculated. Although this difference is not large, and might occur within the limitations of error with a single experiment, it seems desirable to secure additional evidence before formulating conclusions.

APPENDIX TO DIGESTION EXPERIMENTS.

TABLE XVII.

DIGESTIBILITY OF MIXED HAY.

SHEEP 1.	Dry substance.	Ash.	Organic matter.	Protein.	Fiber.	Nitrogen free-extract.	Fat.
Amount fed in 5 days, 3,000 grs	2,694.1	139.3	2,554.8	200.2	882.3	1,390.2	82.1
Amount excreted in 5 days	1,230	97.8	1,132.2	103.8	452.8	537.9	38.1
Amount digested in 5 days.........	1,464.1	41.5	1,422.6	96.4	429.5	852.3	44.0
Per cent digested..................	54.4	28.8	55.7	48.2	48.7	61.3	57.2
SHEEP 2.							
Amount fed in 5 days, 3,000 grs.....	2,694.1	139.3	2,554.8	200.2	882.3	1,390.2	82.1
Amount excreted in 5 days	1,275.2	100	1,175.2	114.7	450.6	562	47.8
Amount digested	1,418.9	39.3	1,379.6	85.5	431.7	828.2	34.3
Per cent digested..................	52.7	28.2	54	42.7	48.9	59.6	41.8
SHEEP 3.							
Amount fed in 5 days, 3,000 grs	2,694.1	139.3	2,554.8	200.2	882.3	1,390.2	82.1
Amount excreted in 5 days.........	1,238.5	95.7	1,142.8	110.8	454.4	538.8	38.8
Amount digested.....	1,455.6	43.6	1,412.0	89.4	427.9	851.4	43.3
Per cent digested	54.1	31.3	55.3	44.7	48.5	61.2	52.7
Average per cent digested.........	53.7	29.4	55	45.2	48.7	60.7	50.6

TABLE XVIII.

DIGESTIBILITY OF SOUTHERN CORN SILAGE.

SHEEP 1.	Dry matter.	Ash.	Organic substance.	Protein.	Fiber.	Nitrogen free-extract.	Fat.
Amount fed in 5 days 10,000 grs....	1,360	114.9	1,245.1	152.2	418.9	627.2	46.8
Amount excreted in 5 days	482.1	55	427.1	61.2	131.9	218.9	15
Amount digested	877.9	59.9	818	91	287	408.3	31.8
Per cent digested	64.6	52.3	65.7	59.8	68.5	65.1	67.8
SHEEP 2.							
Amount fed in 5 days 12,500 grs ...	1,700	142.6	1,556.3	190.2	523.6	784	58.5
Amount excreted in 5 days	604.5	71.4	533.1	75.3	166.6	272.3	18.9
Amount digested.....	1,095.5	71.2	1,023.2	114.9	357	511.7	39.6
Per cent digested.....................	64.5	50	65.8	60.4	68.2	65.3	67.6
SHEEP 3.							
Amount fed in 5 days	1,700	142.6	1,556.3	190.2	523.6	784	58.5
Amount excreted in 5 days........	650.3	76.4	574	76.6	179.3	299.5	18.5
Amount digested	1,049.7	66.2	982.3	113.6	344.3	484.5	40
Per cent digested.........	61.8	46.5	63.1	59.7	65.8	61.8	68.4
Average per cent digested	63.6	49.6	64.8	59.9	67.5	64.1	67.9

TABLE XIX.

DIGESTIBILITY OF MAINE FIELD CORN SILAGE.

SHEEP 1.	Dry matter.	Ash.	Organic substance.	Protein.	Fiber.	Nitrogen free-extract.	Fat.
Amount fed in 5 days, 10,000 grs....	2,036	111.8	1,924.2	243.3	444.9	1,114.7	121.3
Amount excreted in 5 days........	506.8	66.1	440.8	76.7	97.6	252.5	13.9
Amount digested..................	1,530.2	45.7	1,483.4	166.6	347.3	864.2	108.4
Per cent digested..................	75.1	41	77.2	68.5	78.1	77.4	88.5
SHEEP 2.							
Amount fed in 5 days, 10,000 grs....	2,036	111.8	1,924.2	243.3	444.9	1,114.7	121.3
Amount excreted in 5 days........	488.1	67.7	420.5	85.4	92.7	225.2	17.2
Amount digested..	1,547.9	44.1	1,503.7	157.9	352.2	889.5	114.1
Per cent digested..................	76	39.4	78.2	64.9	79.2	79.8	85.8
SHEEP 3.							
Amount fed in 5 days, 10,000 grs....	2,036	111.8	1,924.2	243.3	444.9	1,114.7	121.3
Amount excreted in 5 days........	485.9	68.6	417.3	75.7	97	229.1	15.5
Amount digested..................	1,550.1	43.2	1,506.9	167.6	347.9	885.6	105.8
Per cent digested...........	76.2	39	78.4	68.9	78.2	79.5	87.2
	75.7	39.8	77.9	67.4	78.5	78.9	87.1

TABLE XX.

DIGESTIBILITY OF HAY AND SOUTHERN CORN SILAGE.

SHEEP 1.	Dry matter.	Ash.	Organic substance.	Protein.	Fiber.	Nitrogen free-extract.	Fat.
Hay fed in 5 days, 1,500 grs.........	1,314	70.5	1,243.4	98.8	424.3	677.6	42.7
Silage fed in 5 days, 3,000 grs.......	691	56.9	634.0	76.8	210.7	314.5	32
Total fed..............................	2,005	127.4	1,877.4	175.6	635.0	992.1	74.7
Excreted in 5 days.................	899	88.4	810.6	86.2	290.7	403.8	29.8
Amount digested....................	1,106	39.0	1,066.8	89.4	344.3	588.3	44.9
Per cent digested...................	55.1	30.6	56.8	50.9	54.2	59.3	59
SHEEP 2.							
Hay fed in 5 days, 1,500 grs.........	1,314	70.5	1,243.4	98.8	424.3	677.6	42.7
Silage fed in 5 days, 6,250 grs.......	863.5	71.1	792.3	96	263.3	393	39.9
Total fed..............................	2,177.5	141.6	2,035.7	194.8	687.6	1,070.6	82.6
Excreted in 5 days....................	895.1	86.4	808.7	94.6	287.3	397.3	29.4
Amount digested....................	1,282.4	55.2	1,227.0	100.2	400.3	673.3	53.2
Per cent digested...................	58.9	38.4	60.3	52	56	62.9	64.4
SHEEP 3.							
Total fed..............................	2,177.5	141.6	2,035.7	194.8	687.6	1,070.6	82.6
Excreted in 5 days....................	935.8	88.6	847.2	94.8	312.8	410.7	28.9
Amount digested....................	1,241.7	53.0	1,188.5	100.0	374.8	659.9	53.7
Per cent digested...................	57	37.4	58.4	51.4	53.9	61.7	65

TABLE XXI.

DIGESTIBILITY OF HAY AND FIELD CORN SILAGE.

SHEEP 1.	Dry matter.	Ash.	Organic substance.	Protein.	Fiber.	Nitrogen free-extract.	Fat.
Hay fed in 5 days, 1,500 grs	1,309.5	68.1	1,241.4	99.5	421.4	679.6	40.8
Silage fed in 5 days, 5,000 grs	987.5	57.7	929.7	118.6	218.1	544.1	48.9
Total fed	2,297	115.8	2,171.1	218.1	639.5	1,223.7	89.7
Amount excreted in 5 days	606.5	58.8	547.7	68.5	190.3	271.4	17.6
Amount digested	1,690.5	57.0	1,623.4	149.6	449.2	952.3	72.1
Per cent digested	73.6	49	74.8	68.6	70.3	77.8	80.4
SHEEP 2.							
Total fed in 5 days	2,297	115.8	2,171.1	218.1	639.5	1,223.7	89.7
Excreted in 5 days	771.8	79.6	692.1	94.5	227.7	341.8	28.1
Amount digested	1,525.2	36.2	1,479	123.6	411.8	881.9	61.6
Per cent digested	66.4	-	68.1	56.7	64.4	72.1	68.7
SHEEP 3.							
Total fed in 5 days	2,297	115.8	2,171.1	218.1	639.5	1,223.7	89.7
Excreted in 5 days	756.3	74	682.3	88.1	236.3	333.7	24.1
Amount digested	1,540.7	41.8	1,488.8	130	403.2	890	65.6
Per cent digested	67.1	-	68.6	59.6	63.1	72.7	73.2

FEEDING EXPERIMENTS.

Large or Small Hay Ration.

One of the subjects that have received more or less attention at farmers' institutes in the past is the amount of hay that can be profitably fed to milch cows. It has been claimed on the part of some of our prominent farmers that if hay is the only coarse food that a cow of ordinary size is eating, fifteen pounds is as much as she will consume with profit when combined with a fairly liberal grain ration.

Some have gone so far as to claim that the yield of milk and butter from the fifteen pounds of hay has, in their experience, been as large as from twenty pounds, the grain ration being the same in both cases, and have explained such a result on the ground that with the large hay ration the animal fails to digest her food properly and so wastes it. Others disagree with this practice and profess not to be able to keep their cows up to a generous flow of milk and a thrifty condition with so small an amount of hay, unless they give an increased grain ration.

In the winter and spring of 1894 the Station undertook to test this matter by an experiment. Briefly stated, the plan of the experiment was this: Three cows were fed during three periods of four weeks each. In the first and last periods the animals received five pounds of hay as a noon feed, but in the second period this was taken away.

A record of the food consumed, the weight of the cows and the yield and composition of the milk was made. The data obtained do not furnish so decisive testimony either way as could be desired, although the figures here presented, accompanied by the observations that were made concerning the general appearance and condition of the animal, give to the experimenter a good basis for an opinion.

The daily rations for the several periods were as follows:*

First Period 28 days. Cows 1 and 2.	First half	13 pounds hay. 25 pounds silage. 2 pounds cottonseed meal. 5 pounds corn and cob meal.
	Second half	13 pounds hay. 25 pounds silage. 2 pounds cottonseed meal. 5 pounds corn meal.

The cow Agnes received the same ration during the first period only that she ate fifteen pounds hay throughout.

Second Period 28 days. Cows 1 and 2.	First half	8 pounds hay. 25 pounds silage. 2 pounds cottonseed meal. 5 pounds corn meal.
	Second half	8 pounds hay. 25 pounds silage. 2 pounds cottonseed meal. 5 pounds corn and cob meal.

The cow Agnes received the same ration during the second period only that she ate ten pounds hay throughout.

Third Period 28 days.	All cows received in this period the same rations as during the first.

The corn meal and corn and cob meal were from the same lot of Maine grown corn.

A sample of the milk of each milking was taken during the last five days of each half period, and the following is the composition for each five days' test.

* For composition of foods see report of L. H. Merrill.

COMPOSITION OF MILK.

PERIOD 1.

	Cow 1.		Cow 2.		Agnes.	
January 30, morning	11.87	3.25	13.08	4.10	13.48	4.30
night	13.29	4.50	13.22	4.45	18.81	4.85
January 31, morning	12.75	3.55	12.79	3.85	13.95	4.70
night	12.53	3.95	12.87	4.15	13.56	4.45
February 1, morning	12.14	3.25	12.49	3.85	13.82	4.55
night	12.86	4.15	13.57	4.80	13.60	4.80
February 2, morning	12.20	3.40	12.42	3.95	13.79	4.70
night	12.33	3.95	13.39	4.25	13.43	4.30
February 3, morning	11.88	3.10	12.60	3.90	13.75	4.35
night	12.61	3.85	13.21	4.15	13.69	4.40
	12.45	3.69	12.86	4.14	14.19	4.54
February 13, morning	12.08	3.50	12.95	3.90	13.87	4.70
night	12.69	3.80	13.36	4.05	13.72	4.30
February 14, morning	12.35	3.15	13.37	4.00	14.07	4.35
night	13.39	4.30	13.40	4.00	14.69	5.10
February 15, morning	12.28	3.30	13.12	4.15	14.13	4.75
night	12.25	3.75	12.98	4.15	13.02	4.00
February 16, morning	11.94	3.10	12.84	3.85	13.80	4.55
night	12.50	3.85	12.99	4.05	13.63	4.45
February 17, morning	11.91	3.10	12.93	3.90	14.44	5.00
night	12.44	3.95	12.97	4.00	13.39	4.40
	12.38	3.57	13.13	4.00	13.88	4.56
PERIOD 2.						
February 27, morning	12.01	3.50	12.75	3.85	13.10	4.05
night	12.78	4.00	13.36	4.35	13.22	4.50
February 28, morning	12.27	3.35	13.03	3.75	13.70	4.25
night	12.67	3.95	12.67	4.10	13.99	5.15
March 1, morning	12.58	3.75	12.81	4.00	14.12	5.10
night	12.80	4.15	13.26	4.35	13.49	4.65
March 2, morning	12.27	3.40	12.71	3.70	13.91	4.80
night	12.98	4.45	14.17	4.85	13.49	4.55
March 3, morning	12.18	3.40	13.54	4.15	13.80	4.70
night	12.73	4.20	13.01	4.35	13.65	4.55
	12.53	3.81	13.13	4.14	13.65	4.63

COMPOSITION OF MILK—CONCLUDED.

PERIOD 2—Concluded.

	Cow 1.		Cow 2.		Agnes.	
March 13, morning	11.39	3.10	12.87	3.95	13.62	4.95
night	12.22	3.90	13.26	4.50	13.43	4.65
March 14, morning	11.93	3.25	12.52	3.55	13.38	4.30
night	12.50	4.30	12.69	4.55	14.31	5.45
March 15, morning	12.32	3.50	13.09	4.00	13.96	4.75
night	13.39	4.65	13.07	4.25	13.39	4.65
March 16, morning	11.57	3.10	12.90	3.80	13.48	4.30
night	12.52	4.05	13.24	4.30	13.99	4.60
March 17, morning	12.09	3.25	12.76	3.60	14.30	4.65
night	12.69	4.05	12.82	4.15	13.10	4.45
	12.26	3.71	12.92	4.06	13.70	4.67
PERIOD 3.						
March 27, morning	12.11	3.20	13.00	4.05	14.29	4.90
night	13.30	4.60	13.12	4.40	13.88	5.00
March 28, morning	12.64	3.60	12.85	3.80	14.64	5.25
night	12.61	4.30	13.35	4.30	14.39	4.80
March 29, morning	12.11	3.05	13.20	4.00	14.73	5.15
night	13.75	4.70	13.61	4.50	13.99	4.70
March 30, morning	12.50	3.65	12.93	3.90	14.28	4.85
night	13.20	4.80	13.13	4.25	13.92	5.10
March 31, morning	11.75	3.20	13.13	4.10	14.20	5.25
night	14.09	5.25	14.04	4.80	14.05	4.95
	12.81	4.03	13.24	4.21	14.24	4.99
April 10, morning	12.33	3.70	13.33	4.15	14.85	5.80
night	13.59	5.10	13.20	4.20	13.91	4.70
April 11, lost.						
April 12, morning	12.17	3.40	13.19	4.00	14.56	5.45
night	14.12	5.35	13.06	4.55	13.19	4.05
April 13, morning	12.35	3.45	13.05	4.45	13.99	4.65
night	13.79	4.75	13.73	4.40	14.39	5.00
April 14, morning	12.75	3.60	13.33	4.05	15.35	5.85
night	14.48	5.55	14.07	4.65	13.71	4.40
	13.20	4.36	13.37	4.31	14.24	4.99

TABLE XXII.

COMPOSITION OF FOODS AS FED IN DIGESTION EXPERIMENTS.

	Moisture as fed.	In 100 parts water-free substance.				
		Ash.	Protein.	Fiber.	Nitrogen free-extract.	Fats.
CCLXIII Hay—fed alone..............	12.1	5.17	7.43	32.75	51.60	3.05
CCLXIV Hay—fed with So. Corn Silage ..	12.6	5.37	7.52	32.29	51.57	3.25
CCLXV Hay—fed with Field Corn Silage..	12.7	5.20	7.61	32.18	51.88	3.13
CCLXVI So. Corn Silage—fed alone	86.4	8.44	11.19	30.77	46.16	3.44
CCLXVII So. Corn Silage—fed with hay...	86.18	8.24	11.13	30.56	45.44	4.63
CCLVIII Field Corn Silage—fed with hay,	80.25	5.87	12.01	22.10	55 07	4.95
CCLXXXI Field Corn Silage—fed alone...	79.64	5.49	11.96	21.86	54.73	5.96

TABLE XXIII.

WEIGHTS OF AIR-DRY EXCREMENT.*

	Sheep 1.	Sheep 3.	Sheep 4.
	grams.	grams.	grams.
Hay alone...........................	1,302	1,350	1,311
Southern corn silage—fed alone.....	510	637.5	685
Southern corn silage and hay.....	952	946	985
Field corn silage—fed alone.............................	531	507.8	504.4
Field corn silage and hay......................	637	809	788

* For analyses see report of L. H. Merrill.

COMPOSITION OF THE MILK.

AVERAGES FOR EACH FIVE DAYS.

		Cow 1.		Cow 2.		Agnes.	
		Total solids.	Fat.	Total solids.	Fat.	Total solids.	Fat.
Period 1	First half	12.45	3.69	12.86	4.14	14.19	4.54
	Second half..........	12.38	3.57	13.13	4.00	13.88	4.56
Period 2	First half	12.53	3.81	13.13	4.14	13.65	4.63
	Second half..........	12.26	3.71	12.92	4.06	13.70	4.67
Period 3	First half	12.81	4.03	13.24	4.21	14.24	4.99
	Second half..........	13.2	4.36	13.37	4.31	14.24	4.99

FOOD CONSUMED, MILK YIELD, WEIGHT OF COWS AND COMPOSITION OF MILK.

FIRST PERIOD—28 days.		Hay eaten—pounds.	Silage eaten—pounds.	Grain eaten—pounds.	Live weight at end of period—pounds.	Yield of milk—pounds.	COMPOSITION OF MILK. Per cent solids.	COMPOSITION OF MILK. Per cent fat.
First half, 14 days,	Cow 1,	182	350	98	727	407	12.44	3.69
	Cow 2,	182	350	98	753	309	12.86	4.14
	Agnes,	210	350	98	847	320	14.19	4.54
Milk yield first half		....	....	....	....	1,036		
Second half, 14 days	Cow 1,	182	350	98	727	399	12.38	3.57
	Cow 2,	182	350	98	763	338	13.13	4.00
	Agnes,	210	350	98	850	319	13.88	4.56
Milk yield second half......		... ...	....	....	....	1,056		
Total milk yield.........		....	....	....	....	2,092		
SECOND PERIOD—28 days.								
First half, 14 days,	Cow 1,	112	350	98	674	381	12.52	3.81
	Cow 2,	112	350	98	720	323	13.13	4.14
	Agnes,	140	350	98	798	365	13.64	4.63
Milk yield first half		....	....	....	....	1,009		
Second half, 14 days	Cow 1,	112	350	98	670	334	12.26	3.71
	Cow 2,	112	350	98	732	295	12.92	4.06
	Agnes,	140	350	98	814	278	13.70	4.67
Milk yield second half......		....	....	....	....	907		
Total milk yield....		....	... .	....	....	1,916		
THIRD PERIOD—28 days.								
First half, 14 days,	Cow 1,	182	350	98	716	293	12.80	4.03
	Cow 2,	182	350	98	770	288	13.24	4.21
	Agnes,	210	350	98	852	237	14.24	5.00
Milk yield first half		... .	....	....	....	818		
Second half, 14 days	Cow 1,	182	350	98	725	317	13.20	4.36
	Cow 2,	182	350	98	771	310	13.37	4.31
	Agnes,	210	350	98	840	268	14.24	4.99
Milk yield second half......		.... . .	....	....	....	895		
Total milk yield.........		....	... ...	... .	....	1,713		

The testimony of this experiment, as gained from observation of the animals and a study of the figures given in this connection, is unfavorable to the smaller ration of hay.

The withdrawal of the noon feed of five pounds of hay resulted in (1) a diminished flow of milk, (2) a loss of weight of the animals and (3) an appearance of unthriftiness in the cows.

To be sure the cows gave less milk during the third period, after the larger ration was restored than in the previous period on a smaller hay ration, but it was easy for the experimenter to see that the animals were using their food to recover from the depressing effect of an insufficient food supply. It is also noteworthy that during the last half of the third period the cows had not only recovered their loss of weight but had begun to gain in milk yield. The writer cannot resist the temptation to call the attention of those who believe that the ration largely controls the quality of the milk to the fact that although the cows lost flesh and diminished greatly in their product, the quality of the milk seems not to have been influenced.

Attention is also directed to the great variations that occurred from day to day in the quality of the milk, although no changes occurred in the food.

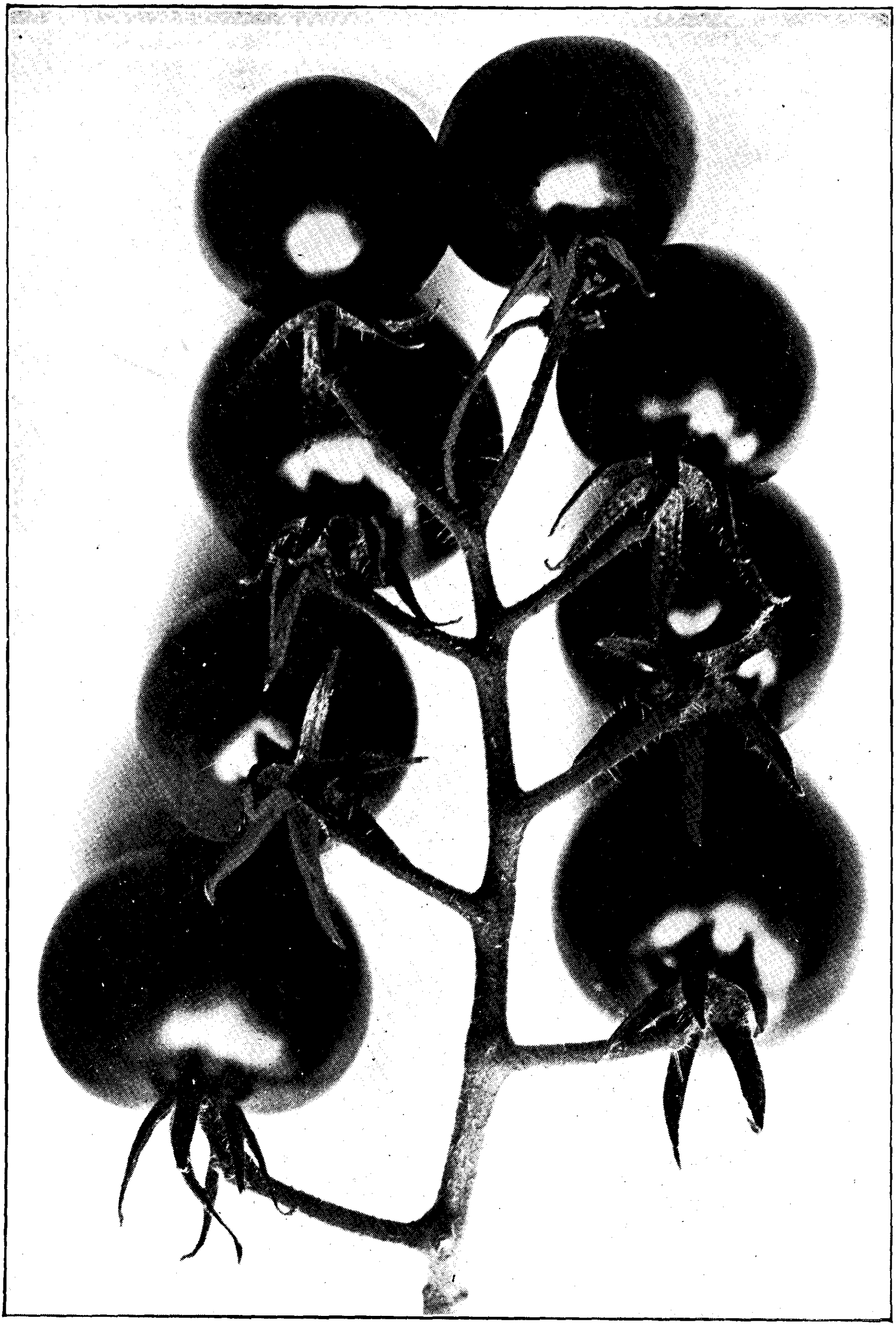


PLATE I. A TOMATO HYBRID. (NATURAL SIZE.)

REPORT OF THE HORTICULTURIST.

HORTICULTURAL NOTES.

W. M. Munson, Horticulturist. H. P. Gould, Assistant.

It has been the policy of the Horticultural Division from the outset to conduct work which should be of permanent value and to continue every investigation through a series of years. Each year's experience gives additional facts for the direction of investigation; the field is ever widening, therefore we have not completed any line of investigation and do not expect to do so.

In addition to our perennial studies it is our purpose to conduct a certain amount of work which shall have an immediate practical value to the farmers of the State. This work is mainly in determining the characteristics of different fruits and vegetables offered for sale, in applying approved methods of culture and in combating the insect and fungous pests of orchard and garden. The interest in this work on the part of the gardeners and fruit growers of the State, as evinced by the increasing volume of our correspondence and the demand for bulletins would seem to justify its continuance, but we would not lose sight of the main point, viz.: that principles are of more importance than isolated facts.

I—Notes of Potatoes.

The Rural New Yorker Trench System.

In 1893 a comparison was made between the ordinary furrow culture of potatoes and the so-called *Rural New Yorker Trench System*. From this work we concluded: "That it is questionable whether the results obtained will justify the extra labor involved in practicing the trench system. * * * Duplicate lots in every instance produced contradictory results."* This conclusion was

*Rep. Me. Exp. Sta. 1893. p. 124.

afterwards called in question on the ground of too deep planting, though the criticism was without reason.

During the past season the work was very carefully repeated on a more extensive scale. The land selected for the purpose was a strong clay loam, naturally moist, but thoroughly underdrained. The land was divided into two plots of one-twentieth acre each.

The variety used in this test was Early Rose. On each plot sixty pounds of a complete fertilizer were applied—broadcast for the common system; in the trench with the other.

The two plots were plowed and harrowed alike. One was then furrowed about four inches deep, and planted in the ordinary manner, the fertilizer applied on the surface.

On the other plot furrows eight inches deep were made. These were then pulverized to a depth of fourteen inches. They were then filled to six inches, after which the fertilizer was distributed in the trenches and covered with two inches of soil. The tubers were then planted in the same manner as on the other plot. The two plots were treated alike during the remainder of the season.

The results obtained from the two lots are shown in a table.

TABLE I.

Treatment.	Whole number of tubers.	Number of marketable tubers.	Weight of marketable tubers—pounds.	Number of small tubers.	Weight of small tubers.
EARLY ROSE.					
Trench	**3,662**	2,077	**599.75**	1,585	**95.25**
Furrow	**3,311**	2,284	**682.25**	1,027	**64.00**

The total number of tubers was greater from the trenches, but the gain was wholly in those which were small and unmarketable. The average size of individual tubers from the two plots was not essentially different, but as seen in column four the number of salable tubers was much larger from the furrows,—there being a difference of 82.5 pounds on the plot. The tops remained green several days longer on the plot which was furrowed than on the other and this may in part account for the relatively large number of salable tubers.

The actual cost of labor in preparing and planting the two plots, after plowing and harrowing, was, for the trench system sixty

PLATE II. FORCING TOMATOES UNDER GLASS.

cents and for the other thirty-two and one-half cents, or a difference of twenty-seven and one-half cents.

Reducing the results above detailed to the basis of one acre we have $5.50 as the increased cost of planting by the trench system with nothing to show for it,—on the contrary with an actual difference of 27.5 bushels in favor of the ordinary method.

We are thus led to the same conclusion as last year, viz.: Results do not justify the extra labor involved in the trench system.

II—Notes of Corn.

Except in our general studies of plant variation, corn has not received marked attention at this station. During the past year, however, several varieties were grown, and some notes concerning their behavior are given. The table indicates in the most concise way the more important points of general interest. All varieties were planted May 27th.

TABLE II.

Variety.	Date of first appearance of tassels.	Date of first appearance of silks.	Date of edible maturity.	Number of days from planting to edible maturity.	Relative yield—scale of 100.	Average height of stalks in feet.
Crosby	July 19,	Aug. 7,	Sept. 1,	**97**	60	6.5
Dreer's Extra Early	July 17,	July 24,	Aug. 15,	**80**	71	5.0
Early Cory	July 11,	July 24,	Aug. 14,	**79**	63	5.0
Early Minnesota	July 14,	July 27,	Aug. 25,	**90**	85	5.5
Marblehead	July 17,	July 24,	Aug. 15,	**80**	66	5.0
Moore's Concord	July 27,	Aug. 7,	Sept. 8,	**104**	58	6.5
Narragansett	July 14,	Aug. 2,	Aug. 25,	**90**	85	5.5
Nonesuch	July 27,	Aug. 9,	Sept. 19,	**115**	42	5.5
Perry's Hybrid	July 17,	July 31,	Aug. 28,	**93**	77	6.5
Stabler Pedigree	July 27,	Aug. 11,	Sept. 19,	**115**	52	7.0
Country Gentleman	Aug. 4,	Aug. 25,	Did not reach edible maturity.	....	....	5.5
Egyptian	July 31,	Aug. 19,		....	....	6.0
Ne Plus Ultra	Aug. 2,	Aug. 22,		....	....	6.0
Ruby	Aug. 4,	Aug. 24,		....	....	6.0
Stowell Evergreen	July 31,	Aug. 19,		....	....	7.0

As seen in Column 5, the varieties in the order of maturity were as follows: Cory, Dreer, Marblehead, Early Minnesota, Narragansett, Perry's Hybrid, Crosby, Moore's Concord, None-such and Stabler. For the average home garden we would select from this list Cory or Dreer for early use and Crosby or Perry's Hybrid for medium and late. The last named sort has been one of our favorites for general crop. As an early sort Dreer was somewhat superior to Cory in that the ears were larger and it was slightly more productive.

Column 6 represents the relative yield; the basis being the average number of ears per plant.

III—Notes of Tomatoes.

1. Historical—Our garden varieties of tomatoes belong to two distinct species,—*Lycopersicum pimpinellifolium*, Dunal, and *Lycopersicum esculentum*, Miller. The former is represented in the garden by the "Currant" or "German Raisin." This species is found wild in Peru and Brazil, but little is known of its history. It has not been modified by domestication and probably has not been long under cultivation. The chief value of this species aside from its use as an ornamental plant and to a limited extent for preserves, is in the breeding of new types, as suggested in previous reports.*

Lycopersicum esculentum, the ordinary tomato, is undoubtedly a native of Peru, but is spontaneous or indigenous throughout Mexico and as far north as Texas and California in a form closely approaching the cherry tomato of the gardens. So far as we know, it was first cultivated in the south of Europe. It is mentioned as early as 1561, while in 1583 the "fruit was eaten upon the continent dressed with pepper, salt and oil."† It was grown in England in 1597‡ but for many years was used only for ornament. Even so late as 1819 only four varieties are named. §

Our own country was even later than England in beginning the general culture of the tomato. The fruit is said to have been introduced into Philadelphia by a French refugee from St. Domingo in 1798,§§ and in 1806 McMahon writes: "The tomato is much

*Report Maine Experiment Station, 1892. 68.
†Dodonæi, Stirp, Hist., 455.
‡Gerarde, Herballe, 275.
§Trans. London, Hort. Society, III, 347.
§§Manning, Hist. Mass. Hort. Soc. 40.

cultivated for its fruit in soups and sauces . . . and is also stewed and dressed in various ways and very much admired."* It was introduced into Salem, Mass., about 1802 by an Italian painter Comé, "but he found it difficult to persuade the people even to taste the fruit."† The general culture of the tomato for market began about 1829.

The history of the introduction of our common varieties is a record of gradual change from the angular sorts of the Orangefield and Hundred Day type to the smooth apple-shaped type of to-day. The old Large Red of the earlier catalogues was followed in 1862 by Fiji Island and in 1864 by the Cook's Favorite. In 1866, Tilden appeared and then in rapid succession Maupay, Keye's Extra Early, Boston Market, General Grant, Trophy and Paragon.

Paragon was the first of the round or apple-shaped varieties to attain prominence, and its introduction gave a great impetus to the culture of the tomato as a field crop. It was a triumph for the application of correct principles of selection, for in the production of this variety the habit of a whole plant rather than the character of an individual fruit was considered.

In 1880, Perfection appeared and during the next decade, Favorite, Beauty, Dwarf Champion, Lorillard, Ignotum, and a host of similar excellent varieties have been put forward, till it would almost seem that further improvement may not be expected.

II—Forcing Tomatoes in Winter.

I have repeatedly called attention to the importance of the winter forcing of fruits and vegetables in supplying a growing demand. Each season during the past four years, we have grown with uniform success many of the more promising varieties, and have attempted to secure new strains and hybrids which would be of special value for forcing. Methods of culture have also received attention and the deductions here given are based on the most careful study of the plants in all of their relations.

General Cultural Notes.—Successful tomato culture under glass depends fully as much on the man in charge as on conditions. Eternal vigilance and the exercise of good judgment on the part of the grower are more essential than strict adherence to set rules. Strong bottom heat, plenty of light and a large volume of pure air

*McMahon, Gard. Calendar. 319.

†Felt, Annals of Salem II, 631; cited by Manning, Hist. Mass. Hort. Soc. 40.

are important conditions and are best secured in a large, well ventilated house. Bottom heat is not absolutely essential to success, but the crop matures much more quickly if given this condition. The house in which all of our work with tomatoes has been conducted is twenty by fifty feet and about eleven feet high at the ridge. The central bed is supplied with six two-inch hot water pipes; the flow being carried overhead to the further end of the house. The accompanying diagram—Fig. 1—represents a cross-section of this house showing the benches and the relative location of the hot-water pipes.

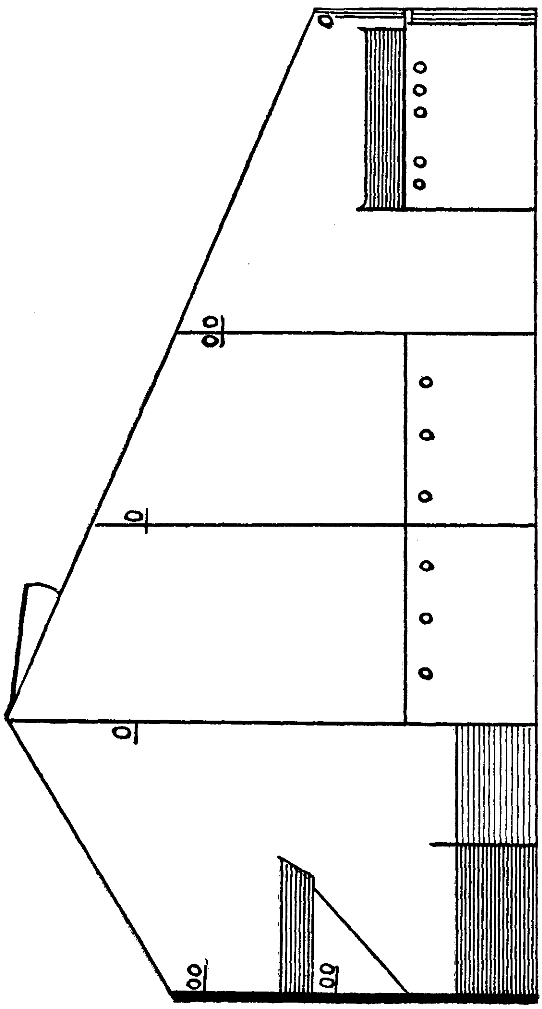


FIG. 1—CROSS SECTION OF FORCING HOUSE.

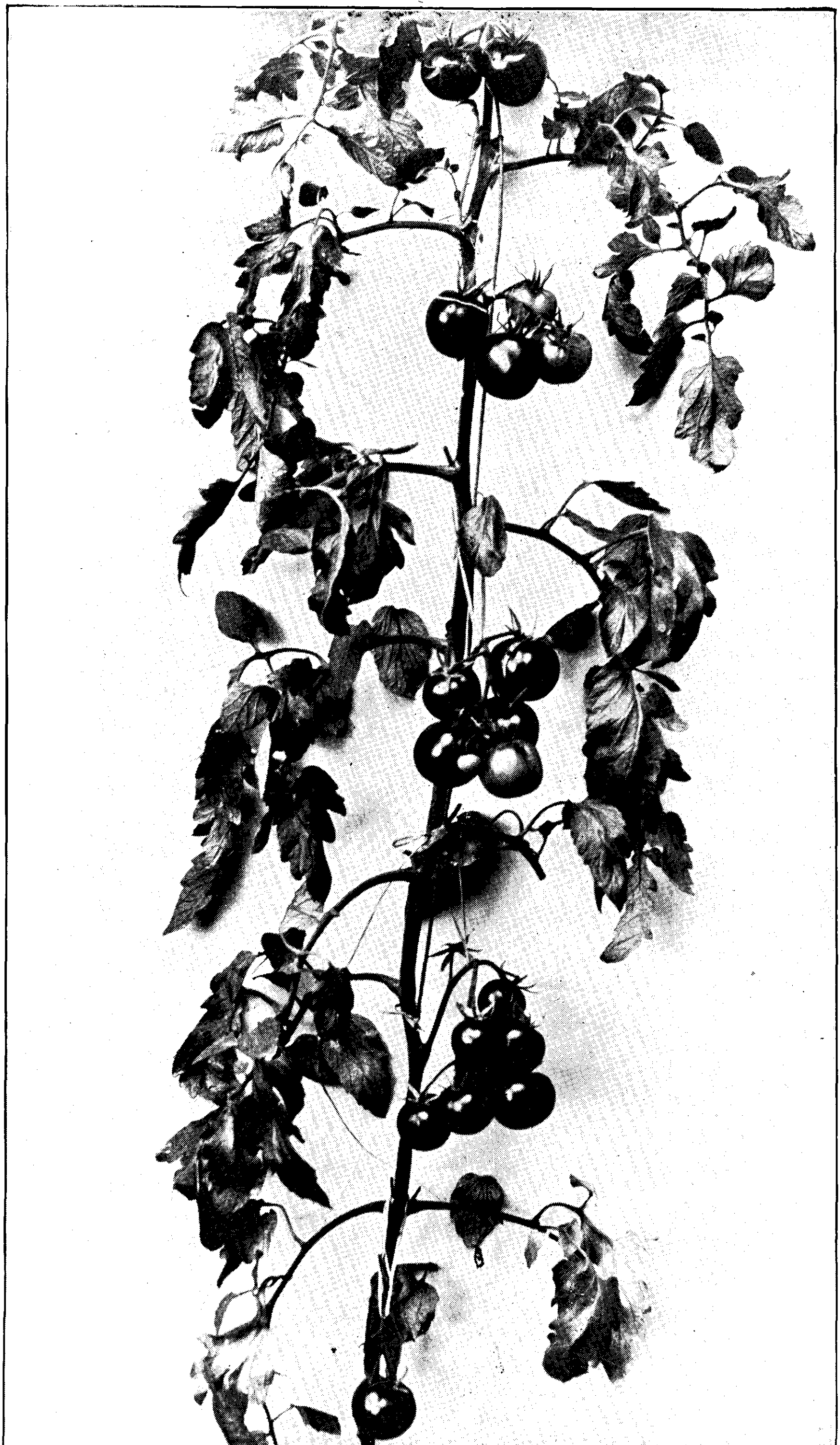


PLATE III. SINGLE STEM TRAINING (CHEMIN MARKET.)

To make the best use of the house two crops should be grown during the season. This will bring each crop on at a season when the expense of heating during a part of the time will be slight. Plants for the first crop should be started as early as the first of August, the middle of July being none too early if the bulk of the crop is desired for the holidays. In case two or more houses are available it is well to make a second sowing in about three weeks to give a succession. For the second crop seed should be sown about the first of November.

The plants are treated in every way as for out-door culture till handled the last time. For the final receptacle for fruiting we have generally used boxes eighteen inches square and one foot deep. In the bottom place a layer of about an inch of charcoal, potsherds or "clinkers" from the furnace; then fill to within two or three inches of the top with prepared soil, consisting of three parts good garden loam and one part well-rotted stable manure. Each box will hold four plants, and the check caused by the partial confinement of the roots seems to be of value in hastening maturity. This point is discussed in another connection (see page 57-59).

We have usually found the best returns to follow when the plants were trained to a single stem, as shown in Plate III.

Flax cords about the size of wool twine are fastened to the corners of the boxes and attached above to wires running lengthwise of the building on the rafters or sash-bars. The plants are secured loosely to this support by means of bast or raffia. All side shoots should be removed as soon as they appear. When the plants are about five feet high, or when about four clusters of fruit have set, the terminal buds should be pinched off. The vitality of the plant will then be expended in the development of the fruit.

As the fruit sets, the clusters should be supported by means of a small cord or piece of raffia passing around the main stem above a leaf, thus forming a sling. At this time, too, it is well to stir the surface of the soil and work in a quantity of well-rotted manure, or to give frequent applications of liquid manure.

The temperature of the house should be as nearly uniform as possible. We usually prefer about 60° at night and 70° in dark weather, but on bright sunny days the mercury may run up to 80° or higher. If possible, avoid cold draughts and sudden changes of temperature.

Until the plants begin to blossom, the atmosphere of the house should be kept moist and the soil, though not saturated, should never become very dry. Our practice, after the plants are removed to the fruiting boxes, is to water thoroughly about three time a week—less frequently in dark weather. On all bright days the walks and tables are thoroughly sprayed.

Some method of artificial pollination is usually found necessary. The best time to pollinate (fertilize) is about noon on bright days when the air in the house is dry. Tomato flowers are highly self-fertile, and the operation of pollinating consists simply in giving each plant two or three sharp taps with a padded stick. Some consider it necessary tq attend to each individual flower, but we have always found the other method satisfactory.

A Comparison of Box Culture with Open Beds.—The writer has frequently expressed a preference for eighteen inch boxes in forcing tomatoes, on the ground that a reasonable confinement of the roots would tend to induce fruitfulness. Some extensive growers, however, maintain that the open bed or border is preferable; though all agree that bottom heat is always to be desired

Each year a dozen or more plants of each of several varieties have been grown in boxes as described on page 57, while duplicate lots have been grown in open beds. These beds were two and one-half to three feet wide and eight inches deep. They were built across the central bench and thus received the same bottom heat as the boxes. The following table represents in detail the results obtained:

TABLE III.

Variety.	First Crop.				Second Crop.			
	First ripe fruit.	Number fruits per plant.	Weight of fruit per plant—pounds.	Average weight of fruits—ounces.	First ripe fruit.	Number fruits per plant.	Weight of fruit per plant—pounds.	Average weight of fruits—ounces.
1892-3.								
Golden Queen.								
Box	....	......	......	......	April 24,	7	1.36	3.1
Bed	....	......	......	......	April 25,	7	.9	2.1
Ithaca.								
Box	Nov. 19,	9	1.4	2.5	April 11,	10	1.66	2.6
Bed	Nov. 23,	9.5	1.1	1.8	April 18,	8	.92	1.8
Long Keeper.								
Box	....	......	......	......	April 17,	13	2.12	2 6
Bed	....	.....	......	......	May 6,	7.7	.8	1.6
*Lorillard.								
Box	Nov. 21,	9.3	1.22	2.2	Nov. 21,	8.2	1.6	3.1
Bed	Nov. 23,	10.3	1.00	1.6	Nov. 23,	7.0	.95	2.1
1893-4.								
Golden Queen.								
Box	Dec. 23,	12.5	2.32	2.97				
Bed	Dec. 16,	11	1.72	2.27				
Ithaca.								
Box	Nov. 9,	15.2	2.19	2.3	May 17,	10.9	1.69	2.47
Bed	Nov. 9,	16	2.25	2.25	May 16,	11.6	1.77	2.44
Long Keeper.								
Box	....	.....	......	......	Dec. 25,	8.8	1.9	3.44
Bed	....	.....	.....	......	Dec. 9,	8.2	1.57	3.05
Lorillard.								
Box	Dec. 16,	17.0	1.81	1.70				
Bed	Dec. 29,	8.7	1.28	2.34				

*Duplicate lots grown for first crop.

It will be observed that in almost every instance the better results were obtained from the boxes. With one or two exceptions, the first fruits were matured from one to thirteen days earlier; the weight of the crop was greater; and the individual fruits averaged larger.

The average results for the whole time may be summarized as follows:

TABLE IV.

	Number fruits per plant.	Weight of fruit per plant—pounds.	Average weight of individual fruits—ounces.
GOLDEN QUEEN.			
Box	9.8	1.84	3.0
Bed	9.0	1.31	2.2
ITHACA.			
Box	11.3	1.73	2.5
Bed	10.3	1.51	2.1
LONG KEEPER.			
Box	10.9	2.01	3.0
Bed	8.9	1.19	2.3
LORILLARD.			
Box	11.5	1.54	2.3
Bed	8.7	1.08	2.0

A Comparison of Plants from House and Field Grown Seed.—Attention has previously been called to the possible importance of conditions of growth of the seed in accounting for variation in the character of succeeding generations. It has seemed "possible that by forcing plants to early development in the house and by limiting the amount of fruit borne, a strain of unusual vigor may be produced." * With a view to throwing light on this subject several varieties have been grown under glass continuously and compared with the same sorts from seed matured in the open air each year, through succeeding generations.

The results are shown in Table III.

* Rep. Maine Exp. Sta. 1893, 116.

VARIETY.	Second Crop 1892-3.			First Crop 1893-4.		
	Average number fruits per plant.	Average weight of product—pounds.	Average weight of individual fruits—ounces.	Average number fruits per plant.	Average weight of product—pounds.	Average weight of individual fruits—ounces.
GOLDEN QUEEN.						
House	....	....	....	14	2.23	3.08
Field	....	....	....	13	2.32	2.97
ITHACA.						
House	5	.87	2.6	11	1.68	2.43
Field	10	1.66	2.6	22	2.45	1.74
LORILLARD.						
House	8	1.46	3.1	19	2.42	2.0
Field	9	1.30	2.4	17	1.81	1.7

VARIETY.	Second Crop 1893-4.			First Crop 1894-5.		
	Average number fruits per plant.	Average weight of product—pounds.	Average weight of individual fruits—ounces.	Average number fruits per plant.	Average weight of product—pounds.	Average weight of individual fruits—ounces.
GOLDEN QUEEN.						
House	13	2.9	3.52	10	1.2	1.90
Field	14	3.0	3.46	12	1.1	1.53
ITHACA.						
House						
Field						
LORILLARD.						
House	13	3.2	3.83	11	1.3	2.1
Field	11	2.4	3.57	11	1.1	1.7

It will be observed that with the Lorillard, the average product per plant was always greater from the strain grown in the house, also that the individual fruits were larger. Ithaca, on the other hand, gave almost opposite results; while Golden Queen has from the first shown practically no difference. Unfortunately, before the above data were compiled, it was found necessary to drop one variety because of insufficient space. From the figures given, however, it would seem that there may be distinct varietal differences with reference to the point in question.

The Relative Merits of Different Varieties for Forcing:—Some varieties seem specially adapted for culture under glass, while others fail to give satisfactory results. Why this is so we do not know; but for the purpose of determining the most promising, we have grown several of the best known varieties for several seasons. Naturally, as the days grow longer in April and May the fruit will be of larger size and the product per plant will be greater than is the case with the first crop—in January and February. The figures given below—table VI—represent the average results obtained including both crops for several seasons.

Several other varieties—including Ignotum, Perfection, Peach, Prelude, Dwarf Champion, etc.—have been grown, but those named in the table have proved most satisfactory.

TABLE VI.

VARIETY.	Average number fruits per plant.	Average weight of product—pounds.	Average weight of individual fruits—ounces.
Chemin Market	12	2.29	3.0
Golden Queen	12	2.22	3.8
Ithaca	11	1.69	2.5
Long Keeper	10	1.86	3.0
Lorillard	13	2.05	2.7
Optimus	13	1.96	2.5

The ideal tomato for forcing should be of medium size—about two and one-half ounces preferred—and should be uniform, smooth, regular, and of firm texture. All things considered, Lorillard answers these requirements more completely than any other sort we have grown; though Optimus has usually done well. Chemin Market is very attractive in appearance, and is of good size, but it lacks solidity. Figures 2 and 3 represent respectively, extremes of solidity to be attained and avoided in a forcing tomato.

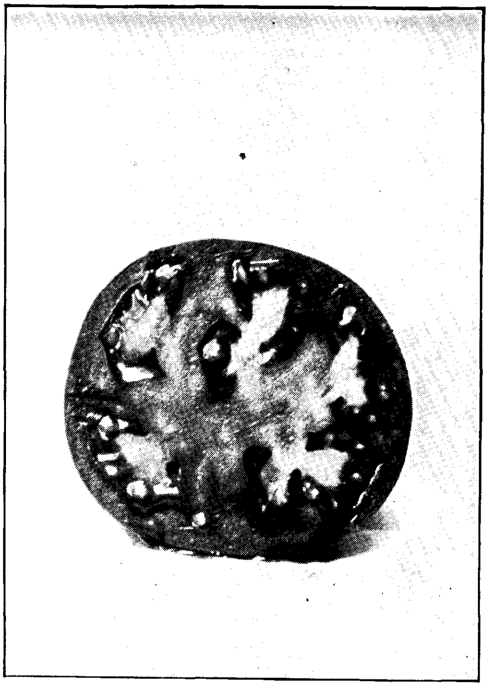


FIG. 2. IGNOTUM.

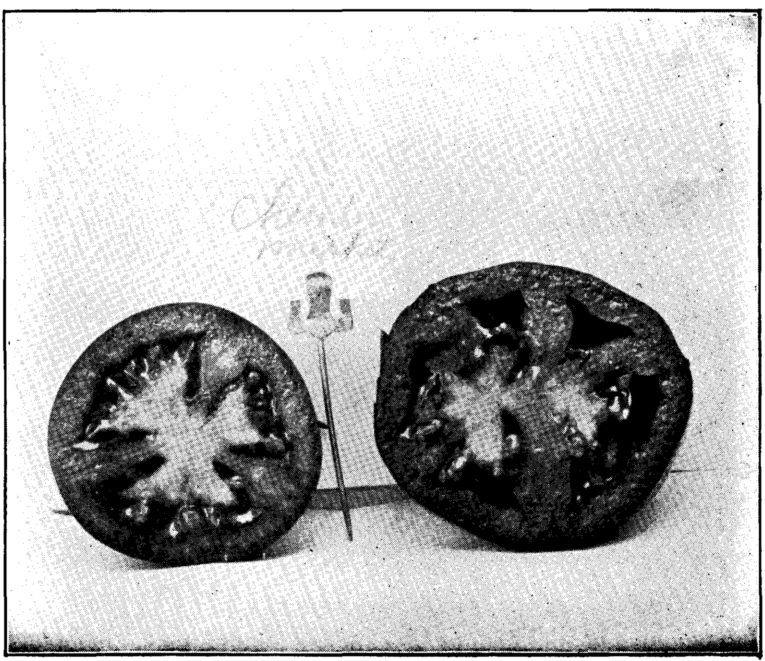


PLATE III. FIG. 3. CHEMIN MARKET.

No collection is complete without a few plants of Golden Queen. This is specially valuable for the pleasing contrast when served with the red or purple fruits.

As will be seen from the table the average yield varies with different sorts from 1.7 pounds to 2.3 pounds, per plant; the mean being about two pounds.

III—Field Notes.

As in previous years cultural methods rather than variety testing received attention in the field.

Effect of Checking Growth before Setting.—The writer has frequently suggested the checking of plants likely to become drawn and "leggy" by cutting back before ready for the transfer to the field. Last season being somewhat cold and backward, there was an excellent opportunity for a comparison. On May 21, a dozen plants of each of three varieties were cut back about four inches and an equal number were left undisturbed for comparison. All were placed in the field May 29.

The results are seen in table VII.

TABLE VII.

Variety and Treatment.	First ripe fruit.	Average number fruits per plant.	Average weight of fruit per plant—pounds.	Average weight of individual fruits—ounces.
Ithaca.				
Checked	Sept. 4,	**37**	**10.6**	4.9
Not checked	Aug. 15,	**45**	**14.8**	5.3
Nicholson.				
Checked	Aug. 27,	**63**	**12.7**	5.1
Not checked	Aug. 9,	**45**	**9.8**	3.5
Osceola.				
Checked	Aug. 15,	**119**	**16.0**	2.1
Not checked	Aug. 4,	**72**	**9.8**	2.1

The Ithaca plants which were not cut back were superior to the others, but with the other two varieties the reverse was true. This difference is no doubt due to the fact that Ithaca is relatively a late variety, while the others are earlier. It will be seen that in every instance the plants which were cut back were somewhat delayed in maturing fruit, but the growth was enough more vigorous so that with sufficient time the crop exceeded that from the other plants.

Effect of Mulching.—The use of a mulch of straw or other litter as a means of conserving moisture has frequently been discussed. While our own practice is to employ frequent cultivation for this purpose, a comparison of the two methods of treatment was made for purposes of illustration.

Several plants of each of two varieties were placed in adjacent plots, May 29. On June 30, after both lots were well started one plot was given a heavy mulch of fine hay—lawn clippings—while the other was given the same cultivation received by the general plantation. The results are shown in the following table.

TABLE VIII.

TREATMENT.	First ripe fruit.	Average number fruits per plant.	Average weight of fruit per plant—pounds.	Average weight of individual fruits—ounces.	Per cent of fruit marketable.
DWARF CHAMPION.					
Mulched	Aug. 9	8	2.1	4.1	67.6
Cultivated	Aug. 13	21	5.9	4.5	86.9
CLIMAX.					
Mulched	Aug. 10	14	4.4	4.8	63.5
Cultivated	Aug. 13	43	13.6	5.0	72.1

The plants which were mulched matured a few days earlier than the others; but in every other respect those receiving cultivation were superior. The individual fruits were larger and nearly three times as many as from the other lot, were ripened before frost, while the per cent of marketable fruits was considerably higher.

Frequent vs. *Infrequent Cultivation.*—The importance of frequent stirring of the soil has often been emphasized. As a practical demonstration of the relative effects of thorough and "slack" culture, two lots of each of three varieties were planted side by side and were treated alike in every way except that after removal to the field one lot received only such cultivation as was necessary to keep the weeds in subjection. The soil was a light, sandy loam, and as the season was very dry during the latter part of July and August, the crop, especially from the later varieties, was very light.

Table IX indicates the comparative results.

TABLE IX.

VARIETY AND TREATMENT.	First ripe fruit.	Average number fruits per plant.	Average weight of fruit per plant—pounds.	Average weight of individual fruits—ounces.	Ratio.
ARISTOCRAT.					
Frequent cultivation	Aug. 10.	14	3.9	4.5	**1.00**
Infrequent cultivation	Aug. 10.	13	3.6	4.6	**1.08**
MAULE'S EARLIEST.					
Frequent cultivation	July 30.	22	8.1	5.4	**1.00**
Infrequent cultivation	Aug. 7.	32	11.6	5.9	**1.43**
TRUCKER'S FAVORITE.					
Frequent cultivation	Aug. 21.	9	3.6	6.7	**1.00**
Infrequent cultivation	Aug. 18.	6	2.2	6.5	**1.64**

The results are not conclusive. Two lots show decided differences in favor of frequent culture; while the third gives as decided indications the other way. It will be observed, however, that in both cases the later maturing sorts are the ones which are benefited by the culture, and it seems not improbable that the other variety, being naturally much earlier, was less affected by the drought.

SUMMARY.

1. The successful cultivation of tomatoes under glass demands good judgment and constant watchfulness on the part of the grower; a large well-ventilated and well-lighted house, the temperature of which can be easily regulated; strong bottom heat, rich soil, care in watering, attention to artificial pollination, and selection of the best varieties.

2. Better results follow the use of boxes than of beds as a receptacle for fruiting plants.

3. There is a marked difference in the adaptability of varieties for house culture, among the best of those tried being Lorillard, Optimus, Chemin, Golden Queen, Ithaca and Long Keeper.

4. The average product per plant should be about two pounds, or one and one-eighth pounds per square foot of floor space.

5. All things considered the Lorillard has proved the most satisfactory tomato for forcing.

6. Plants liable to become drawn and "leggy" before setting in the field may profitably be held in check by cutting back the tops.

7. Plants which were mulched matured a few days earlier than those receiving cultivation, but in every other respect the latter were superior.

8. There was not as much difference as was expected in the results attending frequent and infrequent cultivation.

IV—Notes of Small Fruits.

The culture of fruits is as a rule easier, cleaner, less expensive and often more profitable than that of vegetables. The requirements for labor and fertilizers are less, while with good care the crop is equally certain. From the very nature of the soil and climate of Maine we must look to intensive rather than to extensive operations for the most profitable returns, and at the present time there is no line of work which seems more promising than that of the culture of small fruits. In fruit culture, however, as in all other industries which are profitable, the man who uses his brains will always come out ahead of the one who depends wholly on his muscle. The successful grower must be an efficient, skillful workman, able to put his hand to any of the operations, but his best energies must be spent in planning and directing rather than in executing.

The essential elements of success in small fruit growing as a commercial venture are: Suitable location; thorough preparation; the best varieties; careful planting; thorough culture; the application of business principles in marketing.

THE STRAWBERRY.

A warm, rather moist sandy loam is usually preferred in growing this fruit, but in general any soil that will raise a good crop of corn will rise good strawberries. We would not be understood as encouraging neglect in any way, but the minute directions sometimes given for preparing the soil and for planting are misleading and are enough to discourage any novice from attempting to grow fruit.

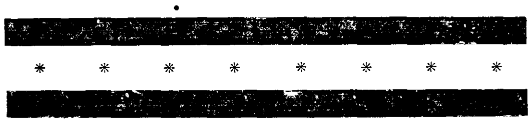
Thorough drainage, either natural or artificial, is absolutely essential, and thoroughness in the preparation of the soil is of prime importance, but the excessive applications of manure and the hand labor frequently advised are unnecessary. It is well to grow some hoed crop as corn or potatoes on the land for one or two years before setting the plants, as in this way there is less danger from attacks of the "white grub."

The month of May is, perhaps, the best time for setting strawberry plants in this latitude, though good results often follow fall setting. Two very important considerations in setting the plants are that the crowns be just even with the surface of the earth and that the soil be pressed firmly about the roots. These points cannot be too strongly emphasized, for to their disregard may be traced more than half the failures in starting new plantings.

For general field culture the "matted row" system is probably best. The rows should be as long as convenient, that most of the labor of cultivating may be performed with a horse. The plants should be set eighteen inches apart in rows which are about four feet apart. Thus placed, a little more than seven thousand plants will be required for an acre. During the first season thorough culture should be practiced. It is also well to keep the runners cut back till the parent plants are strong and well developed.

Winter protection of the plants is always advisable. The value of such treatement is two fold: Not only are the plants protected from injury, but the fruit is kept clean and bright. The best material for the purpose is coarse meadow hay cut before the seeds have ripened. We have sometimes used "shingle edgings" with very satisfactory results. In the vicinity of large mills this material may often be obtained much more cheaply than the hay.

On light gravelly soils we have sometimes resorted to the use of boards on each side of the row of plants as illustrated below:



This device is found a very satisfactory means of conserving moisture and will permit the growth of plants in locations which would otherwise be unsuitable. Naturally this device is recommended only for the home garden.

The question of varieties, although of great importance, is one which must be settled largely by individual growers ; for the success of any variety will frequently depend on local conditions. It is always a good plan to have a trial ground for the newer sorts, as varieties of much promise at the Experiment Station may prove worthless in some localities.

In selecting varieties for planting it is well to bear in mind the distinction between the perfect flowering and the pistillate sorts. Many of our most valuable sorts are pistillate and must have some perfect flowering variety interspersed in order to secure the best results.

The following notes represent our estimate of the varieties fruited at the Experiment Station during the past two years :

Beeder Wood. (Perfect).—Small, spherical, uniform in size early in the season but soon "runs out." One of the earliest and most prolific sorts but of inferior quality. Plants quite subject to rust.

Beverly. (Perfect).—Large, oblong or spherical ; of a rich dark color, moderately good quality, firm, prolific. A promising variety.

Bubach. (Pistillate).—Very large, irregular ; of good color but poor quality, and lacking in firmness. Productive ; valuable for near markets.

Charles Downing. (Perfect) —Of medium size, nearly spherical, moderately firm and of good quality. An old favorite for home use, but not as prolific as some others. Quite subject to rust

Crawford. (Perfect).—Large, nearly spherical, uniform and regular ; productive and of good flavor, but too soft and too light colored for market.

Crescent. (Pistillate).—An old and deservedly popular sort ; but rather small and not of high quality.

Cumberland. (Perfect).—Plants vigorous and prolific ; fruits large and of good quality, but too light colored and soft for market. One of the best for home use.

Dayton. (Perfect.)—Medium to large, smooth and regular ; of good quality but light colored and soft. Excellent for home use but too soft for market.

Epping. (Perfect).—Plants vigorous and prolific ; fruit of medium size, roundish conical, uniform, bright red. A promising variety, received for trial from George Q. Dow, North Epping, N. H., under the name of "Yankee Doodle."

Gandy. (Perfect).—Of medium size, uniform, regular, firm and of good quality. Usually regarded as of special value as a late variety, but has not held its own with us.

Gen. Putman. (Pistillate).—Of medium size, but of pale color, soft and inferior in every way.

Gillespie. (Perfect).—Medium to large, oblong or conical, often with pronounced neck, firm, of good quality and color. One of the best sorts for general purposes.

Greenville. (Pistillate).—Medium to large, roundish conical, uniform, bright red, moderately firm and of good quality. Good for home and near market.

Haverland. (Pistillate).—Medium to large, oblong, regular, firm and of good quality. Plants strong and vigorous; free from rust. A very good sort for general purposes.

Jessie. (Perfect)—An early, sweet berry of good size. Oblong or conical, bright glossy red, handsome and of good quality. It has been one of the most satisfactory with us but is not uniformly reliable.

Jewell. (Pistillate). Of medium size and uniform; but soft and of light color. Not prolific.

Leader. (Perfect).—Medium size, roundish, bright red; fairly good quality. Only moderately productive.

Lovett. (Perfect).—Of the Crescent type. Early, prolific, but running small as the season advances and of second quality.

Michel's Early. (Perfect).—The earliest berry we have grown. Very productive, but small and of second quality. Blossoms very early and the flower trusses are short and well protected. Plants only moderately vigorous.

Mount Vernon. (Perfect).—Medium size, roundish conical, uniform. Of no special value.

Parker Earle. (Perfect).—Very productive, of large elongated fruit having a pronounced neck; firm and of good quality. The plants are very strong and vigorous, but send out few runners, hence should be planted thickly in the row. A valuable sort.

Princess. (Pistillate).—Plant strong, vigorous and productive; fruit a little dull in color, but large, nearly spherical, uniform, moderately firm and of good quality. Medium to late in season. One of the best general purpose sorts.

Sharpless. (Perfect).—Plants vigorous and prolific. Fruit large but somewhat irregular and not always ripening evenly. Of good quality and always reliable.

Smeltzer. (Smeltzer's Early). (Perfect).—Sent for trial by F. H. Smeltzer, Van Buren, Ark. Plants vigorous, healthy and productive. Fruit uniformly of medium size, oblong, firm, of dark rich color and good quality. A promising early variety.

Swindle. (Pistillate).—As grown on our grounds the variety is rightly named. Plants strong and vigorous but not productive. Fruit of medium size, light colored and of very poor quality.

Van Deman. (Perfect).—An early variety; small, spherical; of rich dark color and good quality, but soft and not productive.

Warfield. (Pistillate or with abortive stamens).—Moderately vigorous. Flowers small on short truss and well protected by foliage. Fruit of medium size, firm texture, moderately good quality; ripens evenly, holds its size through the season. Its deep rich color and productive habit make it one of the most valuable market sorts.

West Lawn. (Pistillate).—Sent for trial by C. P. Bauer & Bro., Judsonia, Ark. Plants very vigorous but not productive. Similar in general characteristics to "Cloud," which was sent out a few years ago.

The best of the older varieties above named are; Bubach, Crescent, Haverland, Sharpless and Warfield, with possibly Beeder Wood or Michel's as very early perfect flowering sorts.

Of the newer varieties the following deserve special mention: Beverly, Dayton, Epping, Gillespie, Greenville, Parker Earle, Princess, Smeltzer.

THE RASPBERRY.

The notes given concerning the character and preparation of the soil for strawberries will in general apply to the raspberry. As with the strawberry a rather moist sandy loam is preferred, but lack of such soil need not deter any one from planting. Thorough drainage is, however, absolutely essential.

As is generally known our cultivated raspberries belong mostly to two species—*Rubus occidentalis*, the black caps, and *Rubus strigosus*, the red varieties. A third species—*Rubus neglectus*, has furnished Shaffer, Caroline, and others of the "purple cane" tribe. This species is intermediate in character and habit between those already mentioned and has sometimes been regarded as a hybrid. The European species, *Rubus Idæus*, has also furnished some valuable sorts, such as Foutenay, Brinckle's Orange, Purple Antwerp, etc., but these varieties are not sufficiently hardy for northern latitudes.

The varieties of *Rubus strigosus* are very easily grown and for most purposes are more satisfactory than the black caps. The latter must be handled with great care at the time of setting or fully fifty per cent of the plants will be lost. It is specially important that the crown be placed not much below the surface of the soil. The red varieties, on the other hand, sucker so freely and grow so readily from root cuttings that no special care is required except to comb out the small roots and see that the soil is pressed firmly about the plants. It is well to dip the roots in water before setting—a direction which will hold good in setting any trees or shrubs.

Red rasperries should be set about four feet apart in rows six feet distant; thus requiring about 1,800 plants per acre. If kept in "hills" only five or six of the strongest canes should be allowed in each hill; but a practice very commonly followed is to allow a portion of the suckers to grow between the original plants, forming a hedge-like row.

Clean but shallow culture should follow transplanting. Go through the field with a cultivator as often as once in two weeks till the middle of August. It is, however, unnecessary to "hill up" around the plants. All suckers, except those desired for filling vacancies should be treated as weeds and should be hoed out as they appear.

Pruning is an operation which should receive attention. If done too late in the season, after the canes have become hard and woody, the result will often prove more disastrous than total neglect, as new shoots are developed and these fail to mature before frost. Our practice is to head back the young canes when about two and one-half feet high, and the laterals at about one to one and one-half feet. This method insures strong sturdy growth which does away with the necessity of stakes and trellises. The black caps are treated somewhat differently since longer canes are desired. These it is well to support with a stake.

Winter protection is indispensable with some of our best variaties. The operation, however, is very simple and inexpensive. It consists simply in removing a shovelfull of earth from the side of each bush, bending over the canes and holding them in place by a little earth or other weight. With red raspberries growing in solid rows our practice is to throw a slight bank of earth against the base of the plants, bend them over and lay an old rail or other timber over the tops. The snow will then drift in and afford all necessary protection.

There are at present about thirty varieties of raspberries in the Station garden, but many of these have not fruited and we shall at this time mention only those which have been thoroughly tested.

Cuthbert is perhaps the most satisfactory of the red varieties. The plants are vigorous and productive, succeeding in any reasonable location. The fruit is large and of fairly good quality, but late.

Golden Queen is a sprout from Cuthbert and resembes its parent in every way except color, which is a rich golden yellow. This variety should be in every collection for home use.

Hansell is one of the earliest red varieties. The fruit is of large size and excellent quality while the plants are hardy, vigorous and reasonably productive.

Marlborough is uncertain. Where it will succeed it is a valuable market sort, but the quality is inferior.

Rancocas is valuable because of its earliness. This variety ripens before the strawberries are gone, and is a good sort, but not firm enough for market.

Turner is a good sort for home use, but is too soft and rather small for market. The plant is exceedingly vigorous and hardy. It suckers more freely than almost any other sort.

Shaffer is the favorite variety for canning. Its color is unattractive, however, and it is not generally popular in the markets. It is of vigorous habit and is one of the most productive sorts we have, but is not quite hardy. Because of its value for preserving, and the lateness of its season it is well worthy of protection. It is propagated by tips like the black caps.

We have as yet fruited but few varieties of black caps, and do not advise their general culture.

Of those most commonly grown *Gregg* is perhaps the best. The fruit is large, and the plant is vigorous and productive, but is not quite hardy. A formidable rival of this sort is "Number 101" received for trial from G. C. Brackett, Lawrence, Kansas.

SUMMARY.

1. The essential elements of success in small fruit growing are: Suitable location; thorough preparation; the best varieties; the application of business principles.

2. Winter protection of some kind is always advisable.

3. Of the older varieties of strawberries tried, the best are Bubach, Crescent, Haverland, Sharpless and Warfield, with possibly Beeder Wood or Michel's as very early perfect flowering sorts. Of the newer varieties Beverly, Dayton, Epping, Gillespie, Greenville, Parker Earle, Princess and Smeltzer are promising.

4. Of the raspberries thoroughly tried, Cuthbert, Golden Queen, and Shaffer are the best for general purposes. The black caps are not recommended for general culture.

NOTES ON PLANT-BREEDING.

W. M. MUNSON.

To many people the term "plant-breeding" conveys an indefinite idea of some "hobby" which may be attracting the attention of experimenters, and the immediate *practical* value of the work is not recognized. To meet the inquiries frequently received, a brief outline of the nature of our work in this direction is given at this time—a more elaborate discussion of reasons and principles being deferred until a later date.

There are about 107,000 species of flowering plants, and of these 4,233 species are known to have furnished food for man at some time—either habitually or during famine periods. Of this number about one-fourth are, or have at some time been, cultivated for human food. At the present time there are under cultivation to an important extent about 300 species. But many of these species present varieties almost without number. The apple and pear, for instance, have each given more than 3,000 named varieties; the potato nearly 1,000 varieties; wheat, 400; corn, 200; cabbage, 200; pea and bean each, 150, and other species from 10 to 100 or more.

Now the development of this great number of varieties and forms has been the gradual outgrowth in many cases of centuries of care and selection on the part of man. The apple, the pear, the bean, the cabbage, wheat and some others are known to have been under cultivation for more than 4,000 years, while most of our cultivated fruits and vegetables have been known for from 500 to 2,000 years. From the earliest times nature has been producing plants best fitted to meet the struggle for existence. Nature develops plants with the strongest constitutions and with organs best fitted for self-perpetuation, regardless of other features. It remains for man to develop those organs best suited to his needs, regardless of the natural requirements of the species, and to supply the environment necessary to the preservation of the plant. This has been done in some cases to such an extent that the species would be utterly incapable of existence if dropped from cultivation.

Very few plants now cultivated appear worthy of cultivation in the wild state. The radish, for instance, in its wild state closely resembles the wild charlock—*Raphanus raphanistrum*—a familiar weed throughout New England. The potato in its wild state gives hardly a suggestion of the modern White Elephants or Hebrons or Burbanks. The tomato, which has come into general use within the past hundred years, in its wild state is very small and insignificant, closely resembling the cherry tomato now grown mainly as a curiosity.

Necessity is an important factor in directing attention to the food value of a given species or to variations in form or habit which may be of importance. The continual demand made upon the producer for "something new" impels him to send to the uttermost parts of the earth for seeds and cions and plants to meet this demand. This interchange of plants and seeds is, from a practical point of view, of no small importance, and is deserving of careful study. Are seeds and plants grown in Maine better for local use than those grown in Massachusetts, New York or elsewhere? The question involves the general principle of *acclimatization*, and, indeed, opens a broad field for the study of the effect of climate on the variation of plants.

From the time of Lindley (1799-1865) many of the best horticulturists have contended that acclimatization does not exist; that plants can not be modified so as to be perfectly adapted to conditions not natural; that "all plants demand a particular climate—and we have no power over the constitution of the plant itself." One reason for disagreement on this point is that the true meaning of acclimatization is not borne in mind. The term is confounded with *hardiness* or with *domestication*. Acclimatization has been defined as the "state or condition of being inured, by the act of man, to a climate at first injurious." It differs from *acclimation* in that the latter is a *natural process* wholly independent of the agency of man.

But a slight modification due to changed environment is just as truly acclimatization as is a radical change, and at the present time there seems little doubt that acclimatization does occur. The change may occur through the modification of the constitution or habit of an individual plant or through variation of its offspring.

There is a very general opinion that a change in the individual plant is impossible. The truth can only be determined by growing the same plant in different climates. In general, if cuttings be taken from a certain plant to two other localities and from thence after a period of time, plants be taken to a fourth locality, if marked variations are found to have arisen, we must conclude that there has been a modification of the individual plant.

Again, it is well known that peach trees taken from Georgia to Virginia blossom several days later than do those of the same variety taken from New York or New Jersey. As the peach is propagated by buds, it is evident that the same plant has become modified in habit. It is not improbable that the same rule will hold in case of many if not most of our fruits and vegetables.

The method by which acclimatization most commonly occurs is through variation in offspring. The Russian fruits are illustrations in point. These fruits have been bred in a cold climate so long that they are much hardier than are other plants of the same species as grown elsewhere. The Russian apricot, for example, is simply a hardy race of the common apricot—*Prunus armeniaca*—yet it will often stand a temperature of thirty degrees below zero.

Careful observation of a field of beans or corn or tomatoes after a frost will reveal a marked variation in the hardiness of individuals. By selection from these plants hardier strains may be produced. Similar differences in earliness, in habit of growth, in quality, etc., may always be seen.

In other words, no two individual plants are exactly alike, and the application of the principles of selection is of the greatest importance in building up new and valuable types. The key to the whole matter, in the words of Darwin, is "man's power of *accumulative* selection. Nature gives successive variations; man adds them up in certain directions useful to him."

The highest step in the improvement of plants—that of cross breeding—is of comparatively recent origin. It is the climax of all effort in this direction, and to it we must look in our endeavors to secure hardy or otherwise desirab'e sorts of fruits and vegetables in the shortest possible time. It is in this way that we may hope to unite the quality of more southern varieties with the hardiness and productiveness of our northern sorts.

Any one can perform the mechanical operation of crossing plants, but the haphazard uniting of individuals is of little value. To breed plants intelligently we must have a distinct type in mind and work toward our ideal. In order to do this we must have some conception of the effects likely to be produced. The most prominent effects of crossing, as would be expected, are seen in the offspring; and it is of the greatest importance that care be used in the selection of parents. If the parents are very different in character the offspring will probably be weak. But the converse is also true: A cross between closely related species or races is more vigorous than its parent. It is well proved that "crossing is good for the resulting offspring because the differences between the parents carry over new combinations of characters or at least new powers into the crosses. It is a process of revitalization."*

The limits to which cross-breeding is either possible or profitable are not yet well understood. As a rule closely related species will cross readily while widely different species cross with difficulty; but this rule has very marked exceptions. It seems impossible to cross any of the varieties of winter squash—*Cucurbita maxima*—such as Hubbard, Sibley, etc., with varieties of summer squash or with the pumpkin—*Cucurbita pepo*;—while we feel safe in saying the cucumber and the muskmelon cannot be crossed.

In selecting parents the question naturally arises as to which shall be made the male and which the female parent in order to produce certain probable results. It was formerly held that in case of a hybrid the female parent gives constitution and vigor while the male parent gives form, size, color, etc. But at the present time it is generally conceded that the results will be approximately the same no matter which is used as the male or the female parent.

It is not always possible to select our male and female parents at will. In other words, reciprocal crosses are not always possible. For example, I may cross a yellow bush scalloped squash with the summer crook-neck, but I have never yet been able to cross the crook-neck with the bush scalloped. Other cases of a similar nature are not infrequent. Why is this failure? Is it due to a constitutional peculiarity; to the form of the ovarium; to a weakness of the pollen of the one species or variety, or what may be the underlying cause? The question is yet one of the unsolved problems.

* Cf. Bailey, Cross Breeding and Hybridizing, p. 13.

PLATE IV. LORILLARD × CURRANT (THIRD GENERATION).

There has long been a warm discussion as to whether on the parent fruit there are any immediate external effects of crossing. The evidence at hand at the present time would indicate that within certain restricted limits there is an immediate visible effect of pollen as seen in the pea, the bean and Indian corn. On the other hand it is equally certain that the greater portion of food plants which have received special study do not exhibit immediate effects of pollen. Thus this question remains another of the unsolved problems. Some preliminary notes on this subject and some of the other secondary effects of pollination have already been published.*

In all of the work outlined, the laws of heredity play a most important part, and form a legitimate field for investigation. Breeders of fine stock are not unmindful of the importance of pedigree; and in the vegetable kingdom as well as the animal, crossing and selection, combined with suitable environment and intelligent culture—in other words careful *breeding*—with certain fixed types in view afford a field for investigation which is of the highest importance in its bearing upon practical agriculture.

A record of the successive steps in the improvement, of the parentage, of each successive generation constitutes the *pedigree* of a given race or variety. In careful attention to the production of the foundation stock lies the future value of the race. "Pedigree" is of value as evidence of such care.

But "blood" and selection of parent stock alone are not sufficient Better individuals demand better treatment, and some individuals respond to favorable conditions more quickly than do others. So care in rearing is necessary to the maintenance of the type after it is reached.

The field is new and promising. The expense as compared with that attending stock-breeding is slight; while the results are more quickly known and are far-reaching in their value.

To insure the best results, however, we must first learn more of the laws obtaining in this branch of science; we must know more of the relations between cause and effect, that we may proceed along the most profitable lines. But in the search after laws we may employ plants of economic importance that, perchance, the preliminary work may not be without immediate practical value.

As a practical illustration we may cite the development of a new type of tomato which has attracted considerable attention. (The

* Report Maine Experiment Station, 1892, pp. 29—58.

tomato was chosen for the investigation of certain principles because of the rapidity with which results may be obtained)

The ideal in mind at the beginning of our work with tomatoes was a smooth regular fruit of uniform size and early maturity, bears in large clusters on a sturdy vigorous plant. To this end a

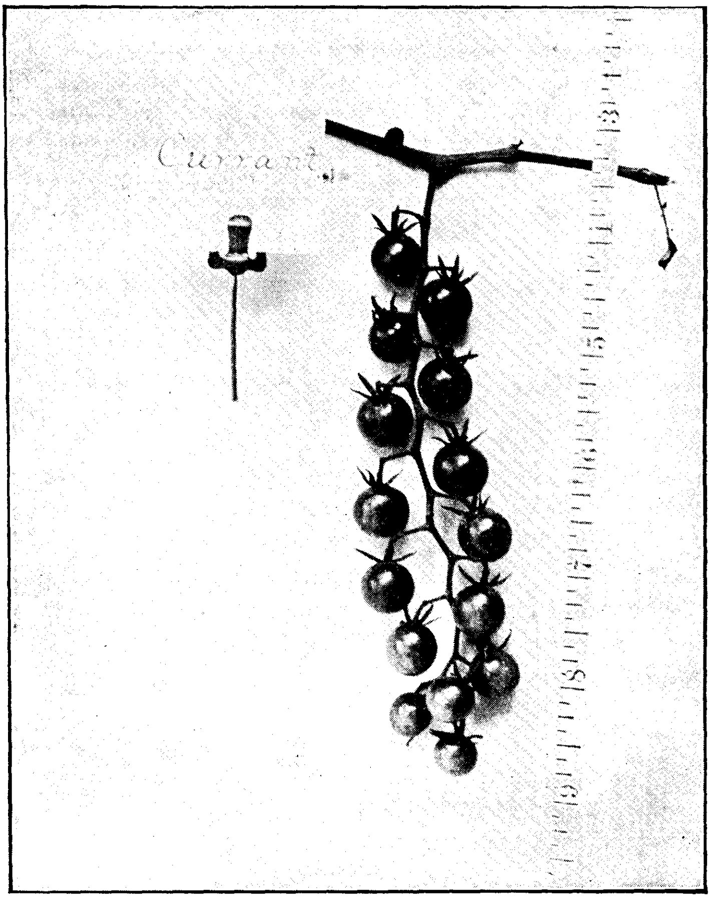


FIG. 4—CURRANT TOMATO.

cross was made between the little Currant tomato (Fig. 4), which possesses the qualities of earliness, productiveness and uniformity; and the Lorillard, (Fig. 5), which is of good size and vigorous habit The resultant hybrid (Fig. 6) was described and figured in a former report.* This hybrid was again crossed with Lorillard for two generations. The prolific habit of the resulting product is shown in plate IV and a cluster of fruit—natural size—from the same plant at plate I. We are now endeavoring by selection to

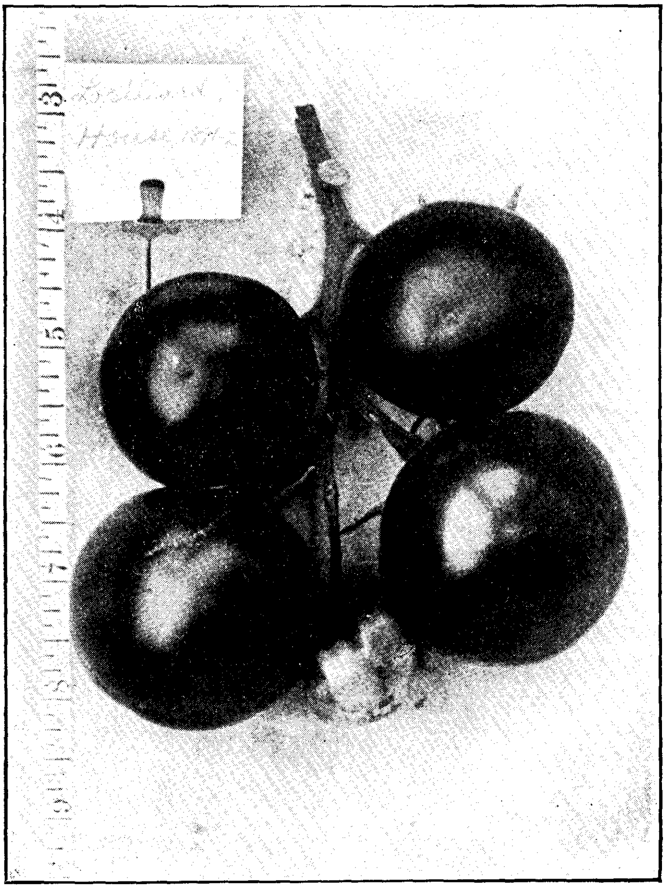


FIG. 5—LORILLARD.

"fix" the type, as we have found that further crossing with Lorillard tends to obliterate the effects of the original male parent.

What then is the ground covered in the general investigation of plant-breeding?

First—A study of the influence of environment, of the laws of heredity and of the principles of selection.

Second—The application of general principles in the production of new varieties of fruits and vegetables to meet special needs.

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*Rep. Maine Exp. Sta., 1892, p. 68.

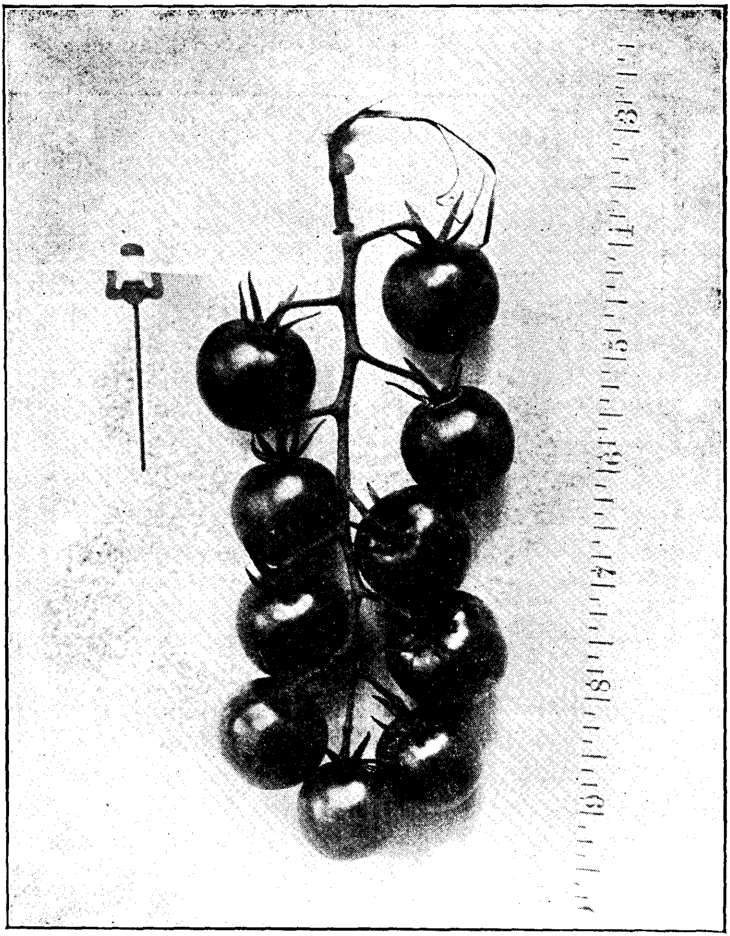


FIG. 6—LORILLARD X CURRANT.

Report of Botanist and Entomologist.

PROF. F. L. HARVEY.

Professor W. H. Jordan:

DEAR SIR—I have the honor to submit herewith my seventh annual report as botanist and entomologist for the Experiment Station. The correspondence regarding injurious insects and fungi, weeds, forage plants and seeds increases rapidly each year. It is gratifying to know that the work of the Station is becoming better known and appreciated. and that the Station is able to extend its usefulness in these directions. As but one-third of the writer's time is given to Station work the correspondence is rapidly encroaching upon the hours that possibly could be better employed making investigations in the field and laboratory. We fully realize that extensive and detailed correspondence must of necessity be an important feature of Station work, though it is only by original research that new facts can be added to entomological and botanical science. We do not desire to limit the correspondence, because the specimens received often are most interesting and important objects for investigation.

The duties of the season have been field work, laboratory investigations, lectures, preparation of articles for the State papers and Science Journals, correspondence and the preparation of this report.

By invitation of the Gypsy Moth Commission of Massachusetts, we visited Malden in July and spent three days in the offices, laboratories and field examining the methods used to fight this insect and submitted to the commission a report of our impressions. In September by invitation and courtesy of Mr. McKeen, we spent two days at Fryeburg examining the area infested by the chinch bug.

Investigations in the laboratory during the season have brought to light several species of insects new to entomological science, some new habits of well known insects, and additional information regarding the life histories and distribution of others. Some new fungi and weeds have been added to the State flora. Descriptions of some of the new species of insect were contributed to Entomological Journals, as the scope of Station reports is limited to matters of economic importance. We were called twice during the season to lecture before farmers' clubs and also delivered fifteen lectures to the winter students in agriculture upon Injurious Insects and Fungi.

Below will be found tabulated the more important plants and insects that have claimed attention. These tables are presented from year to year, as a record of the most important insects and plants claiming attention and are valuable for reference. Specimens new to the State, or of special importance are considered in detail and illustrated.

THE ORANGE RŒSTELIA has been very abundant the past season in southern and western Maine doing much damage to quince bushes. This fungus is considered in detail in the body of the report.

THE PEAR-LEAF BLIGHT which in our last report we stated was spreading in the vicinity of Portland has appeared this season in the Penobscot valley in the vicinity of Belfast and Northport.

The PEAR-TWIG BLIGHT (*Micrococcus amylovorus*, Burrill,) has also done some damage about Northport.

The BLACK KNOT continues to be reported and will no doubt be prevalent as long as bird cherry, laden with the knots, can be found on nearly every farm in the State.

INCONSPICUOUS HELMINTHOSPORIUM and COMMON CLADOSPORIUM, two fungus parasites, feeding upon the juices of the leaves and stems of oats, have been found to be the cause of their dwarfing and prematurely turning yellow.

THE YELLOW ROCKET or WINTER CRESS, FALSE FLAX or GOLD OF PLEASURE and *Berteroa incana*, DC, all plants of the mustard family (*Cruciferæ*) have been found in the State. The first two quite abundant. The third is mentioned as it is a weed new to the State, introduced in 1893 in clover seed. It is associated with THE DITCHOTOMOUS CATCHFLY a weed found in the State the past season for the first time and belonging to the pink family (*Caryophyllaceæ*).

THE CANADA THISTLE has been reported as a weed in meadows. It should be eradicated as quickly as possible.

THE ORANGE HAWKWEED as shown by the table, which gives new localities, is spreading rapidly.

THE FALL DANDELION *improperly called Arnica* is also spreading.

THE WILD CARROT is also increasing. We saw considerable of it last summer in meadows in western Maine. This is a biennial and should be pulled by the roots.

Authemis tinctoria. A relative of the may weed was received from western Maine and reported as quite abundant.

THE FLAX DODDER, (*Cuscuta epithymum*, Murr.) was found in some abundance in a clover field in Bradley. This parasite on clover, so far as we know, has not been before reported from Maine.

THE COMMON SNOW FLEA a small blue-black, wingless, jumping insect found on the snow on warm days in spring was received from Mr. McKeen. It sometimes collects on the surface of water or is troublesome by getting into sap tubs. These simple structured insects are believed by entomologists to be the lowest. They are like the earliest insects that were on the earth, the ancesters of the varied and complex forms of the present age.

THE SILVER MOTH (*Lepisma*) was reported from western Maine. This insect belongs to the same order as the snow flea (*Thysanura*) though quite different in habits. It feeds upon starchy and sugary matter and frequents closets and pantries often doing much damage.

THE RING-BANDED SOLDIER BUG was found preying upon the larvæ of the potato beetle. It is figured in the body of the report.

THE ELM TREE BARK LOUSE, *Lecanium Caryæ,* Fitch; *Var Canadense*, Cockerell. There is a bark louse of a mahogany brown color and hemispherical shell. It is very abundant upon elm trees all over the State and must do much damage. The branches in spring are sometimes literally alive with the young lice. These remain active all winter and develop the brown hemispherical scales over themselves the following spring. They can be found during the winter months as small oblong reddish brown objects lying close to the bark on the twigs. The leaves in early summer are often alive with them. The eggs are reddish and oblong. The scales are often punctured by parasites, probably a species of ichneumon, also a species of mite is often found under the scales in great numbers. We have had this species under observation every season for the past eight and there is hardly an elm tree in the vicinity of Orono but what is infested. The scales drop off sooner or later exposing a circular wooly patch. We received specimens from Mr. Moore of Presque Isle during the season showing its wide distribution. We sent specimens to Mr. Cockerell who pronounces it an undescribed variety. Mr. Cockerell has kindly sent us a MSS description which we incorporate in the body of the report.

There has been considerable complaint about an insect that destroys the terminal buds of gooseberry canes causing the growth of numerous small lateral shoots in a cluster near the ends of the branches. The specimens sent us this year and last were not accompanied by any live insects, but as the leaves showed numerous molt skins we concluded it must be the work of *Myzus ribes*, THE GOOSEBERRY PLANT-LOUSE.

THE CABBAGE BUTTERFLY (*Pieris rapæ*) is very abundant in Maine and interferes seriously with the culture of cabbage. There are various subtances that can be applied to check this pest, but none are effectual except *arsenical compounds* applied as spray, or in the form of powder. As arsenic is poisonous it should not be applied after the heads are a third grown.

We receive occasionally a large pale green moth with long tails to the hind wings. This is the LUNA MOTH, a night flying species, the larvæ of which feeds upon the walnut and hickory and no doubt other plants, as it is rather common about Orono and there are no native walnuts or hickories.

THE OBLIQUE-BANDED LEAF-ROLLER does considerable damage to currants and raspberries and other plants of the ROSE family.

We receive the CECROPIA EMPEROR MOTH so often that it is regarded best to publish cuts of this conspicuous species which feeds upon the leaves of apple trees.

The CHINCH BUG which is found over quite a large area in the vicinity of Fryeburg has done quite a good deal of damage annually to grass lands after haying for a great many years. It is not confined to the intervales about Fryeburg, but it has been reported from Bridgton on the east and from the vicinity of Bethel twenty-five miles to the north.

We received specimens of a HAWK MOTH known as (*Smerinthus cerysii*) from Mr. A. N. Townes, Winthrop, Me. This is a rare species and we mention it on this account. The early stages in its life history have never been published. We secured a large number of fertile eggs and have been able to rear the insects and make notes upon all the stages. Prof. Braun of Bangor, and Mr. Ora Knight, one of my pupils, have aided in the study. The notes will be contributed to some Entomological Journal. The species feeds upon the willow and poplar.

THE BUFFALO CARPET BEETLE is doing considerable damage to carpets in southern and western Maine, and has also been reported from Bangor and Belfast. We wrote an article for the Lewiston Journal on this insect, which is published in the body of this report.

The MAPLE TREE BORER OR BEAUTIFUL CLYTUS, a common insect in Maine, was received from Mr. McKeen and found in Augusta, about maple trees.

The PEA WEAVEL is very common in Maine. We figured this insect in our last report on page 175. This insect can be readily destroyed in stored peas by the use of BISULPHIDE of CARBON, as recommended for destroying the BEAN WEEVIL in our last report on p. 176.

THE BROWN GRAIN BEETLE (*Tribolium ferrugineum*, Fab.) was received from *Mr. Edward* of South Paris. The specimens were in middlings which were literally alive with them. It is a brown insect, oblong in form and about one-eighth to three-sixteenths of an inch in length. It frequents neglected grainaries, museums, kitchens and storerooms feeding upon both vegetable and animal matter.

THE OAK BARK BEETLE (*Magdalis olyra*) was received from Mr. Moore of Presque Isle where it was doing considerable damage to the foliage of elm trees. So far as we know this species has never been reported as an elm tree insect.

Those insects that require more than a passing notice and record are described more fully in the body of the report.

DIRECTIONS FOR SENDING SPECIMENS

Will be found in the Annual Report of the Experiment Station, 1888, p. 194, or in the Maine Agricultural Report, 1888, p. 158.

CORRESPONDENCE.

Correspondence regarding injurious insects and fungi is invited. Plants and insects will be named whether injurious, beneficial or neutral. When of economic importance their benefits or injuries will be pointed out and remedies for injuries suggested.

REMARKS.

The cuts to illustrate this report were obtained as follows: Fig. 1, loaned by Prof. Halstead; Figs. 7, 8 and 9, from J. B. Lippincott & Co.; Fig. 11, from U. S. Dept. of Agric.; Fig. 5, loaned by Prof. J. B. Smith; Figs. 2, 3, 4, 6 and 12 and Pl. 1, are after drawings made by the writer.

PLANTS REPORTED AND EXAMINED—1894.

No.	Common Name.	Technical Name.	From Whom Received.	Remarks.
1	Orange Rœstelia	*Rœstelia aurantiaca*, Peck	M. B. Whiting, East Northport... John A. Dennett, North Berwick,	Fungous disease upon quince trees affecting the twigs. Very common in southwestern Me. in 1894.
2	Pear Leaf Blight	*Entomosporium maculatum*, Lev	John G. Brooks, Belfast ... M. B. Whiting, East Northport...	Affecting the leaves of pear trees. For description see Ex. Station Report, 1892, p. 109.
3	Pear Blight	*Micrococcus amylovorus*, Burrell	M. B. Whiting, East Northport	Causing the twigs of pear trees to turn black and the leaves wither. See Me. Ag. Rep't 1889, p. 101 in Pom. Society Report.
4	Apple Scab	*Fusicladium dendriticum*	M. Wiggins, Bridgton	Causing scabby spots on leaves and fruit of apple trees. See Ex. Sta. Rep. 1888, p. 149, '89, p. 182, '90, p. 113
5	Black Knot	*Otthia morbosa* (Schw.), =*Plowrightia morbosa*, Sacc.,	John G. Brooks, Belfast ... John B. Holbrook, Peak's Island,	Infesting plum trees causing warty excrescences. See Me. Ag. Rep. 1889, p. 103 (Pom. Soc. Report.)
6	Inconspicuous Helminthosporium	*Helminthosporium inconspicuum*, C. and E., var. *Britanicum*, Grove. (Sacc. Syll. IV, p. 412,	B. Walker McKeen, Augusta .... Z. A. Gilbert, North Greene ...... F. L. Harvey, Orono...	Causing oats to turn yellow before maturity.
7	Common Cladosporium	*Cladosporium herbarum* (Pers.), Sacc. Syll. IV, p. 350,	F. L. Harvey, Orono	Causing oats to look sickly and early turn yellow.
8	Yellow Rocket—Winter Cress,	*Barbarea vulgaris*, R. Br	A. M. Piper, East Madison .... O. H. Perkins, Sanford	Weed in grass land. Weed in open damp fields.
9	False Flax, or Gold of Pleasure	*Camelina sativa*, Crantz	A. M. Piper, East Madison	Weed in grass land. See Ex. Sta. Report 1889, p. 185.
10	....	*Berteroa incana*, D. C	C. H. Gould, North Bridgton, and many others in Western Maine,	Growing in grass land. Introduced in 1893. A bad cruciferous weed.
11	Night Flowering Catchfly	*Silene noctiflora*, L	F. L. Harvey, Orono	Weed on lawns and waste places.
12	The Dichotomous Catchfly	*Silene dichotoma*, Ehrb	From many persons and localities which are mentioned in the body of the Report....	Introduced in grass seed in 1893, the weed maturing in '94. New to the State. Introduced from continental Europe.
13	Canadian Hypericum	*Hypericum Canadense*, L	Miss Helen M. Port, Kennebunk...	For determination.

14	PURPLE AVENS	*Geum rivale*, L.	O. H. Perkins, Sanford	In low meadows. A weed.
15	COMMON EVENING PRIMROSE	*Œnothera biennis*, L	E. B. Lufkin, East Orrington	Rank weed in fields and waste places.
16	SUNDROPS	*Œnothera fruticosa*, L.	Stephen Larrabee, Dexter	Weed in grass lands.
17	SWEET SCENTED BED STRAW	*Galium triforum*, Mx	Miss Helen M. Port, Kennebunk	Weed in border of fields and wood land.
18	CANADA THISTLE	*Cnicus arvensis*, Hoffm.	A. M. Piper, East Madison	Weed in grass land.
19	SUCCORY, or CHICORY	*Cichorium Intybus*, L.	A. M. Piper, East Madison	Weed in grass land.
20	ORANGE HAWKWEED	*Hieracium aurantiacum*, L	F. L. Harvey, Brewer A. M. Lufkin, East Orrington Philip H. Stubbs, Strong. Edwin E. Buker, Richmond Cor., Will P. Winslow, Larone	Weed in meadows and grass land. See Experiment Station Report, 1892, p. 106 (illustrated).
21		*Anthemis tinctoria*	C. H. Gould, North Bridgton	Related to the Mayweed. Weed in grass land. Also found in Penobscot Co. about Brewer in 1886.
22	ROUGH HAWKWEED	*Hieracium scabrum*, Mx	Miss Helen M. Port, Kennebunk	Weed in border of fields and open woods.
23	INDIAN PIPE—CORPSE PLANT	*Monotropa uniflora*, L.	Mrs. A. M. Garland, South Dover	In pasture lands.
24	CLOVER DODDER	*Cuscuta Epithymum*, Murr.	F. L. Harvey, Orono	Clover fields Bradley, Me. New to the State.
25	TURTLE-HEAD, SNAKE-HEAD	*Chelona glabra*, L.	Miss Helen M. Port, Kennebunk	Weed in low meadows.
26	NAKED BROOM RAPE	*Aphylon uniflorum*, Gray	Fred W. Cousins, West Kennebunk,	Moist soil by roadside.
27	MAD-DOG SKULLCAP	*Scutellaria galericulata*, L.	E. G. Knights, Waterboro	In low grass land. A weed.
28	CHESS, or CHEAT	*Bromus secalinus*, L.	W. H. Keith, Winthrop	Weed in grass land and cultivated fields. See Experiment Station Report, 1891, p. 183 (illustrated).
29	YELLOW, or HOP CLOVER	*Trifolium agrarium*, L	S. H. J. Berry, Wayne	Weed on roadside. Poor for hay.

INSECTS REPORTED AND EXAMINED—1894.

No.	Common Name.	Technical Name.	From Whom Received.	Remarks.
1	Snow Flea	*Achorutes nivicola*, Fitch	B. Walker McKeen	Abundant in June about the roots of a tree. More often observed upon the snow in warm winter days or in the spring.
2	Silver Moth	*Lepisma Saccharina*, L	Mrs. Rose C. Johnson, Gorham,	Very abundant about the pantry. Eating sugar, paste, etc. Also does damage to books and clothing.
3	Ring-banded Soldier Bug	*Perillus circumcinctus*, Stal	Gustavus Pease, Bean's Corner,	Parasite upon the larvæ of potato beetles, piercing the larvæ with the proboscis and sucking out the soft parts.
4	Chinch Bug.	*Blissus leucopterus* Say	F. L. Harvey, Orono	Doing considerable damage to grass lands after haying, and also some damage to corn fields. Over a large area in the intervales about Fryeburg, Bridgton and Bethel, Me.
5	Elm-tree Bark Louse	*Lecanium caryae*, var. *canadense cockerell*	Delano Moore, Presque Isle	Coccid or bark louse. Very common on elms about Orono, Me.
6	The Gooseberry Plant-louse	*Myzus ribis*, L	Delano Moore, Presque Isle	Causing numerous small twigs to start from lateral buds near the end of the shoots, making a terminal bunch of small twigs and dwarfed leaves.
7	Hellgramite Fly	*Corydalis cornuta*	Geo. M. Pillsbury, Lisbon Falls,	The larva which was received by us is called "Dobson" by anglers, and is used as a bait for bass. It is found in ponds and streams.
8	Cabbage Butterfly	*Pieris rapæ*. L	Wm. J. Higgins, Fairfield.	Infesting cabbage. Lays its eggs upon cabbage, which hatch into cabbage worms.
9	The Luna Moth	*Attacus luna*	B. Walker McKeen	A night-flying species. The larva is said to feed upon the walnut and hickory.
10	Oblique-banded Leaf-roller,	*Cacœcia rosaceana* (Harris.)	Chas. S. Pope, Manchester	Attacking the leaves of currants and rasp berries, causing them to roll.

11	CECROPIA EMPEROR MOTH	*Platysamia cecropia* (Linn.)	James Steele, Cherryfield	Cocoons attached to the limb of an apple tree.
12	....	*Smerinthus cerysii*, Kirby	Albion V. Towns, Winthrop	Found on Bracken Fern. Male and female mating. Food plant, willow and poplar.
13	THE BUFFALO CARPET BEETLE	*Anthrenus Scrophulariæ*	Geo. W. Jeffery, North Monmouth, and several other parties in Western Maine.	Destroying carpets, rugs and woolen garments.
14	THE BEAUTIFUL CLYTUS	*Clytus speciosus*, Say.	B. Walker McKeen, Augusta	The larva boring in maple trees.
15	PEA WEAVEL	*Bruchus pisi*, L	E. T. Perkins, Saco	Doing damage to peas. Causing what are called "Buggy peas."
16	THE BROWN GRAIN BEETLE	*Tribolium ferrugineum*, Fab	Chas. Edwards, South Paris	Found in great numbers in middlings.
17	OAK-BARK WEEVIL	*Magdalis olyra*, (Herbst.)	Delano Moore, Presque Isle	Eating holes in the leaves of elm trees and hazel bushes. Very abundant.
18	.. ..	*Thalessa lunator*, (Fabr.)	A. B. Ripley, Augusta	Boring into dead maple trees to lay their eggs. This is the largest of our Ichneumons. The ovipositor, fully two inches long. Parasitic upon the Tremex saw fly.

BOTANY.

THE ORANGE-COLORED RŒSTELIA OR QUINCE RUST.

Rœstelia aurantiaca, Peck.

Order *Uredineæ.*

The following letters were received during last July, in which were enclosed quince twigs affected by the above fungus.

EAST NORTHPORT, ME.,
July 25, 1894.

Prof. F. L. Harvey:

DEAR SIR—I enclose a twig from one of my quince bushes, having on it apparently some sort of fungous growth. On some of my bushes this has appeared numerously. It must be very injurious if allowed to grow. Will you please give me your opinion of it? In my limited reading on quince culture I have come across no reference to such a disease. Respectfully,

M. B. WHITING.

We wrote Mr. Whiting regarding the nature of the disease and below is given his interesting reply:

EAST NORTHPORT, ME., July 31, 1894.

Prof. F. L. Harvey:

DEAR SIR—Please accept my thanks for very full description of quince disease contained in yours of 27th inst. I knew of the rust, but was not before aware that it took the form of an excrescence on the twigs. In this case the cause of infection is undoubtedly to be traced to my cedar hedge, which extends in front of house, the quince is growing behind the house and separated from the hedge by it. The quince bushes are young, having been set only last year. The fungus did not appear until this season. The cedar, however, has no fungus on it, and its foliage is almost entirely free from rust or those dead, discolored twigs, which I presume is rust. I think it may be, as you suggest, that my quinces were already affected when I received them, as most of the Geneva, New York, nurseries, whence they came, grow arbor vitae. I had intended to go quite extensively into quince culture, as I think, barring disease, it could be made a success here; but unless I can prevent the rust of course it will be useless for me to attempt it.

Do you think that the Bordeaux mixture would prove effectual, both to cedar and quince? I do not wish to remove my hedge.

Respectfully,

M. B. WHITING.

We also received through Hon. B. Walker McKeen specimens of this same disease accompanied by the following letter from Mr. Dennett.

NORTH BERWICK, ME., July 15, 1894.

MR. SECRETARY—Inclosed I send for your inspection, a growth I find upon three quince trees, I bought from New York nurseries, and set last spring. One each of three varieties, Fuller, Alaska and Meech Prolific. They have started finely, but upon almost every twig there is a growth of this kind. I do not understand it, for it has never appeared on our Orange and Champions that we have had growing for years. Do you think it is anything like the black knot of plum trees that should be destroyed to prevent it from spreading? The trees have started thriftily, but it looks as though this would work their destruction. Can you please tell me what should or can be done with them? I dislike to destroy them unless it shall be necessary.

Very truly yours,

JOHN A. DENNETT.

In answer to some questions regarding the occurrence of cedar trees near Mr. Dennett's orchard we received the following, which strengthens the belief that the nursery stock was infected.

NORTH BERWICK, ME., February 5, 1895.

Prof. F. L. Harvey:

DEAR SIR—In answer to your esteemed note of 29th ult., will say that we have no cedar growth in this vicinity within miles of us, neither do I know of any cedar ornamental growth or hedges about here. The unaffected Orange and Champion were older trees which had been set several seasons, this fungus attacked the new set quince that I had from New York and New Jersey nurseries, (Green's and Lovett's,) hardly a twig of which escaped. I took the precaution to cut off and burn all the fungous growth and if it should appear again this season I will report to you, as it was entirely new to me and of which I am entirely unacquainted.

Very truly yours,

JOHN A. DENNETT.

As this fungus has been very abundant in southern and southwestern Maine during the past season, and is almost sure to appear again, we give for the benefit of all concerned the following account of the disease:

NATURE AND DISTRIBUTION.

This fungus has two stages in its life history, which are found upon very different plants. The *Gymnosporangium* or Cedar Apple stage, which occurs upon the Red Cedar and Low Juniper, members of the Order Coniferæ, and is known as *Gymnosporangium clavipes*, C & P. The *Rœstelia* or Rust stage (known as *Rœstelia aurantiaca*, Peck.) which occurs upon the Sugar Pear, (Amelanchier) Pear thorns (Cratægus), Choke Berry (Pyrus arbutifolia) and the cultivated quince and apple trees, all plants belonging to the Order Rosaceæ.

The first stage of the disease is probably as widely distributed as cedar trees and has been detected throughout the New England, Middle and most of the seaboard Southern States.

This stage of the disease is the *forerunner* of the *Rœstelia* or *Rust* stage, which cannot occur without it. The Red Cedar and Low Juniper are, therefore, responsible for the occurrence of the Rœstelia or Rust upon quince and apple trees. After the *Rœstelia* has become established in quince and apple trees it is *probably perennial*, that is, the mycelium may live in the twigs and produce spores from year to year.

The spores produced by the Rœstelia upon plants of the Order Rosaceæ can only grow when they find lodgment under proper conditions upon cedar trees, and then they produce the *gymnosporangium* stage or cedar apples.

The mycelium of the gymnosporangium is abundant causing the twigs of cedar trees to become swollen and much branched and the leaves to swell to double their natural size and become pointed and spreading. This is well shown in Fig. 1, A, which represents a diseased branch with enlarged and pointed leaves and bearing the reddish or brownish sporiferous masses. Fig. 1, B, shows a normal branch and Fig. 1, C, one of the ovate, two-celled spores which is germinating.

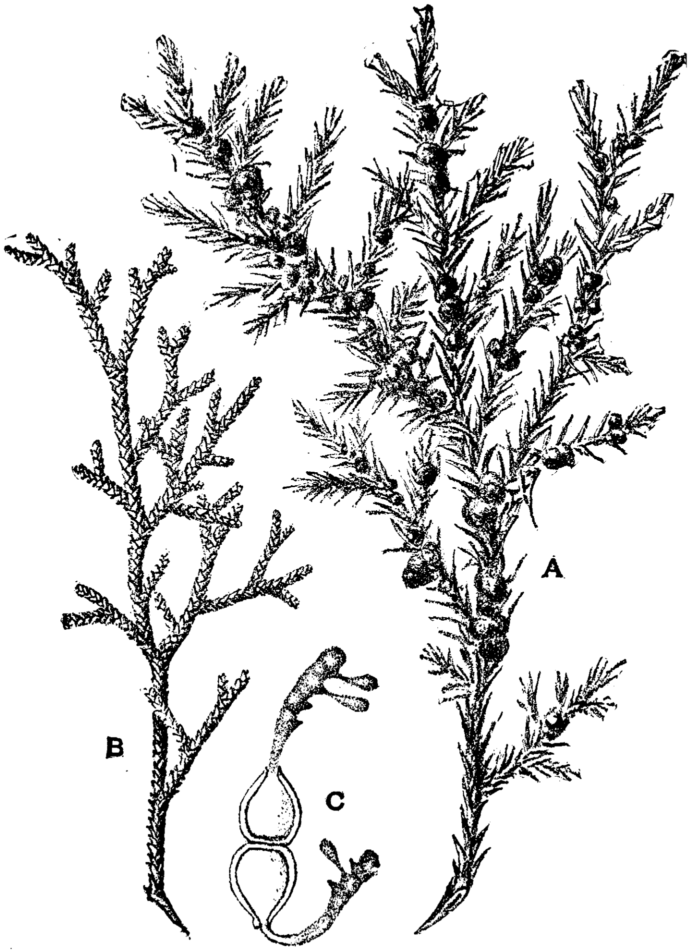


FIG. 1. A—Diseased cedar twig. B—Normal twig. C—Germinating spore.

At a distance this disease gives the appearance of birds' nests in the boughs. It is believed to be perennial.

The *Rœstelia* makes its appearance upon the young fruit and twigs of quince trees and other rosaceous plants early in the summer. It first sends its threads through the host producing orange spots in which pimples appear. From the top of these pimples short shining white horns (Peridia) are developed which are coarsely toothed at the top and contain the bright orange spores.

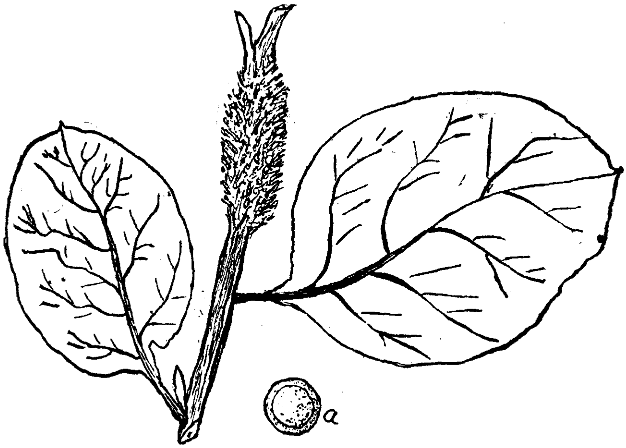


FIG. 2. Quince twig affected by Roestelia. a—Spore enlarged (original).

Fig. 2, shows a quince twig affected by the fungus; Fig. 2, A, one of its spores enlarged.

The leaves of the specimens received were also affected by another species of *Gymnosporangium* (G. *lacerta*) which had passed its prime. Those of *Rœstelia aurantiaca*, Peck, were in their prime when received in July.

REMEDIES.

1. As this fungus is perennial upon cedar trees it could not be killed by spraying with Bordeaux mixture. Possibly if sprayed at the time the spores were ripening they might be killed and prevented from being blown to quince and apple trees. This would be practical only upon hedges and ornamental trees. It would not be practical to spray forest trees. The rust stage of this disease is an *internal parasite* and has done its worst work when the orange patches and excrescences appear on quince and apple twigs, fruit or leaves. It would do the quince or apple trees no good to spray at that time. To spray early in spring when the spores from cedar trees are floating in the air would suggest itself as a preventive measure. To spray when the Rœstelia spores are ripe would probably destroy them and prevent the infection of cedar trees. There have been no spraying experiments tried with this disease so far as we know.

2. As the galls on cedar trees furnish the spores of this disease, all cedar trees in the vicinity of the orchard should be destroyed if possible. This would greatly lessen the chances of infection but

would not entirely remove the danger, as spores of fungi are sometimes carried long distances We have seen this rust upon sugar pear (Amelanchier) where there were no cedar trees nearer than a half mile, and they could be carried much farther.

3. It is probable that this rust is *perennial* upon quince and apple trees. The disease might, therefore, be introduced upon affected nursery stock and be very bad the first season after the trees are set. The experience of Mr. Dennett could be explained upon the basis that the Fuller, Alaska and Meech Prolific were affected when they came from the nursery, while the Orange and Champions escaped because there was no local cause of infection. If this supposition is correct the disease ought to disappear next season if the fungus is annual, or continue and not spread if perennial. It is the belief that *Rœstelia* spores will not spread the disease to other quince and apple trees. We will be much interested in the developments at Mr. Dennett's. There have been no carefully conducted experiments to prove whether the *Rœstelia* stage of this disease is *perennial* nor so far as we know to show *conclusively* that *Rœstelia* spores (æcidiospores) may not produce *Rœstelia* directly. Carefully conducted experiments are needed to settle these points.

4. It would be well to cut and burn the twigs bearing excrescences before the spores are liberated, and also to destroy all affected fruit.

DISEASES OF OATS.

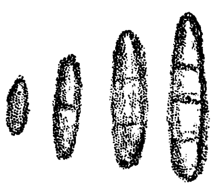
Helminthosporium Inconspicuum, C. & E. *Var. Britanicum*, Grove.

During the summer of 1893 we received through Mr. Z. A. Gilbert specimens of oat plants which had turned prematurely yellow. We were informed that this condition was common in certain portions of the State. As we were unable to find any fungus at work we concluded *as the season was wet* that it was probably a case of malnutrition due to poor drainage and excess of moisture. This season the complaint was renewed by Mr. McKeen. The specimens he sent were found to be badly infested by a species of *Helminthosporium* which we submitted to Mr. J. B. Ellis who decided that it was the species named at the head of this article. It is described in Saccardo's Sylloge IV, p. 412. The type form of this species is reported from New Jersey and New York, upon living and languishing leaves of *Zea Maydis*. The variety is reported from Warwickshire England and so far as we know has not been reported before from the United States. The conidia of our specimens were 40—80x15 m m and 1—5 septate. See Fig. 3. Saccardo gives the dimensions 60—100x12x22 m m and 4—5 septate. The spores of our specimens are somewhat shorter and sometimes with less septa. This fungus is no doubt truly parasitic and capable of producing the languishing condition of the oat plants. In the specimens sent by Mr. Gilbert the disease had not progressed far enough to show the spore, masses which were dark brown colored and appeared as small dark dots or lines upon the leaves sent by Mr. McKeen.

Specimens taken from an oat field upon the college grounds that appeared to be similarly affected yielded, upon examination, another fungus known as

Cladosporium herbarorum (Pers.)

Fig. 3.



Original. Fig. 4.

The conidia of this species are 6—20X5—7 mm and without septa or 2—3 septate. This species is almost world-wide in distribution and attacks members of several botanical families. It is described in Saccardo's Sylloge IV, p. 350. The spores are shown much enlarged in Fig. 4.

The languishing of oat plants in Maine is, therefore, due to the combined action of the two parasites named above. As they are both *internal parasites* we know of no remedy for them. They would probably be much worse in wet, warm seasons and on low land.

NIGHT-FLOWERING CATCHFLY.

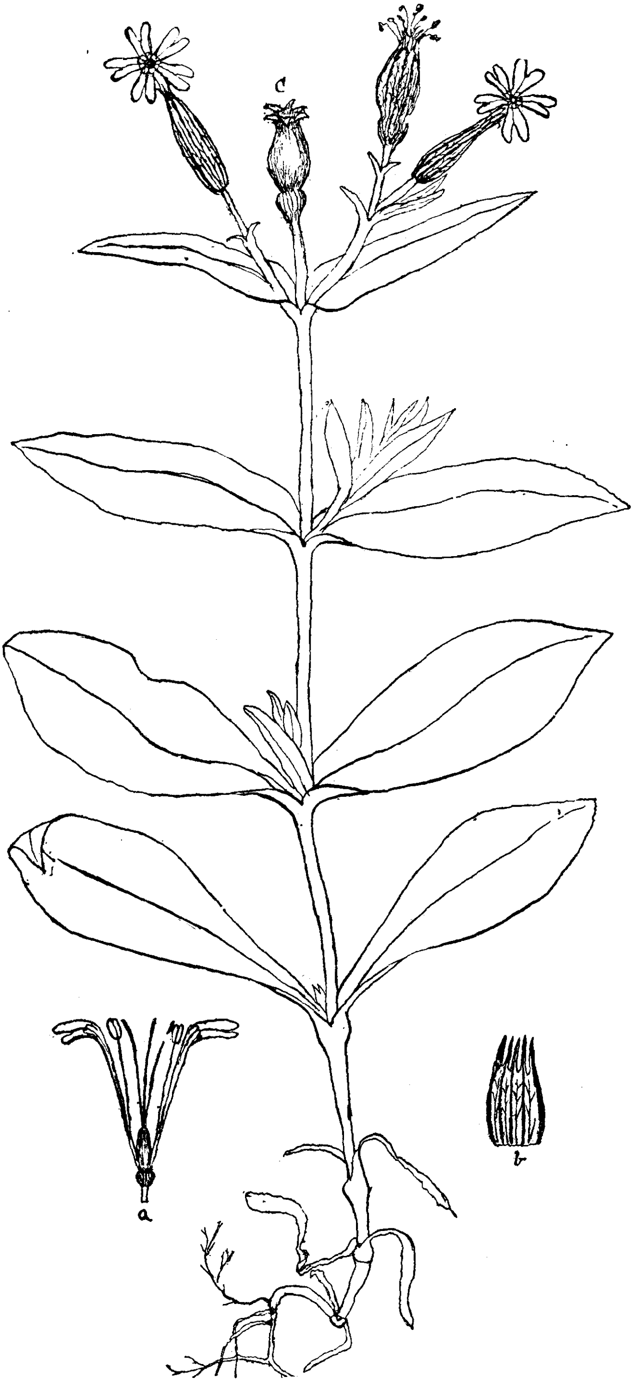
Silene noctiflora. L.

ORDER CARYOPHYLLACEÆ: PINK FAMILY.

This species of catchfly occurs sparingly in Maine in cultivated and waste grounds and roadsides. We found quite a number of specimens the past season upon lawns and waste ground in Orono, probably introduced in grass seed.

It is a coarse plant from three inches to three feet high, with viscid, pubescent leaves. The lower leaves spatulate; the upper lanceolate and pointed. Short, leafy branches, often from the axils of the opposite leaves. Flowers in loose cymes, pedicilate, and usually bearing a single flower, though sometimes more. The central flower of the inflorescence opening first

Calyx large after flowering becoming ovoid, greenish white with ten dark green nerves tending to anastomose, the teeth attenuate. Petals creamy white, often with a tinge of pink, bifid. Flowers about one-half inch across, bearing a ten-toothed crown, closing in the bright sunshine, but open in the shade and on cloudy days. Fragrant. Plant annual, though seeds from the early flowering ones soon sprout, and, we think, often blossom and seed before fall. The plate on the opposite page shows a plant reduced about one-fifth. (*a*) Cross section of flower. (*b*) Portion of calyx showing the anastomosing veins. (*c*) A mature capsule with the calyx removed showing dehiscence.



NIGHT FLOWERING CATCHFLY—*Silene noctiflora*, L. (Original.)

THE DICHOTOMOUS CATCHFLY.

Silene dichotoma, Ehrb.

ORDER CARYOPHYLLACEÆ: PINK FAMILY.

During the past season we have received specimens of the above catchfly from the following localities:

NAME.	ADDRESS.	KIND OF SEED SOWN.
D. B. Johnson	Freedom, Me	Clover, red top and herdsgrass.
Gustave Bellows	Freedom, Me	Clover, red top and herdsgrass.
Daniel Hustus	Freedom, Me.	Clover, red top and herdsgrass.
Frank Johnson	Freedom, Me	Clover, red top and herdsgrass.
Stephen Larabee	Dexter, Me	Red clover, alsike, herdsgrass.
B. W. Mitchell	Dexter, Me	Red clover, alsike, herdsgrass.
Horace S. Martin	Buxton Center, Me	Red clover, alsike, herdsgrass.
E. E. Light	Union, Me	Red clover, red top, herdsgrass.
Nelson W. Adams	Turner Center, Me	Red clover, red top, herdsgrass.
C. H. Gould	North Bridgton, Me	Red clover, red top, herdsgrass.

We also learn that this weed has been found at Farmington (C. H. Knowlton), East Livermore (Kate Furbish), Hartford and North Berwick (J. C. Parlin), and York (E. P. Bicknell.)

The above shows that this weed is widely introduced in Maine. We examined one lot of seed in 1893 that contained over a dozen bad weed seeds and among them the seeds of this catchfly. We condemned the seed. If wholesale dealers who import from other states or countries would receive samples and have them examined before purchasing and each wholesale dealer was required by state law to submit samples to a state inspector before retailing, the introduction of so many bad weeds could be averted. There were at least four bad weeds introduced in the State in 1893-4. It is to the interest of dealers to offer pure seed and they will probably not knowingly sell poor seed. To secure the selection of good seed the Station botanist will aid dealers and purchasers by inspecting samples submitted. From the record given above it will be seen that only one party sowed alsike and that one party who did not sow redtop had the weed, and that all who had the weed sowed herdsgrass and clover. The weed was therefore introduced either with herdsgrass or clover. As the seed of this catchfly is much larger than herdsgrass, darker colored, different shaped and with a rough surface, it would be easily detected in herdsgrass, while in clover seed it would probably escape detection by the casual observer. It was probably introduced with clover. The seed has been traced directly or indirectly to a single wholesale establishment. The seed was sold in 1893 and two years has elapsed and the dealer has no samples left and cannot tell where the seed was purchased, so it is impossible to trace it outside the State.

This weed was introduced in seed sown in 1893. It germinated that season, lived over winter and bloomed in 1894. After the grass was cut in 1893 the young plants of this weed were abundant proving it to be a winter annual or biennial. The following letter from Mr. Adams gives the facts regarding the introduction of the weed which are confirmed by the other correspondents:

TURNER CENTER, MAINE, July 4, 1894.

Prof. F. L. Harvey:

DEAR SIR--Last year I purchased enough grass seed to seed down an acre and three-fourths. The seed was a mixture of timothy, redtop and clover and was sown with barley on one piece, and with hungarian grass on another. After the grain and grass were removed in the autumn, I saw a great number of plants growing with the young grass and I thought they were oxeye daisies, judging by the form of the leaf, but when it headed and blossomed I found it was something entirely new to me and to every one to whom I have shown it.

I took a plant to Mr. Lyman Abbott, the agricultural editor of the Lewiston Journal. He didn't know what it was and never saw anything like it before. To-day I saw Mr. Z. A. Gilbert and was talking to him about it, and he said if I would send a stalk of the plant to you, I could find what it was and all there was to learn about it. I have seen fourteen or more stalks growing from one root, and the plants on the entire field are as near together as one on every square yard and on much of it as near as one on every square foot; now I am anxious to know if it will spring up from the root after it is cut this year, and if it is a plant that cattle will eat after it is cut and cured as hay, and if they will eat it, if it is healthful or injurious in case they will eat it.

If you can give information on this subject, you will not only oblige me, but a great number besides myself who are engaged in the same business. I am very respectfully yours,

NELSON W. ADAMS.

DESCRIPTION.

This species of catchfly introduced from Europe, is closely related to the *Night Flowering Catchfly* already described. It may be known by the follownig description:

Tall, two to four feet high, more or less clothed with hairs, often reddish and viscid. Probably winter annual or biennial, often over *fifteen* stems from a single root and dichotomously branching toward the top where they bear the one-sided racemose inflorescence. Leaves lanceolate or oblanceolate, those at the base of the flowers near the ends of the branches, small, reddish, three nerved, scarious margined and about half the length of the flowers. Flowers short, pediciled, or nearly sessile, about five-sixteenth inches long; calyx, cylindric in flowering, becoming ovoid in fruit, the ten *bright green nerves* which run from the base to the tips of the lobes strongly hirsute along the back and with *no anastomosing veins*. Diameter of flowers one-half inch, petals white or roseate, obovate, deeply bifid and bearing at the base a two lobed scale which with the others form a crown.

The beautiful seed broadly kidney shaped, light brown, 1.33 mm. $\times$ 1.06 mm. Its surface densely covered with elevations arranged concentric and radiate from the hilum. Those near the hilum narrow, smaller, darker, smooth, bordered and unmarked. Outward from the hilum the papillæ become larger, more conical, oblong, bordered by from 10 to 20 teeth and bearing at the summit a round black dot. The teeth of the contiguous papillæ often interlock.

This species can be told from the other catchfly which we figure by its numerous stalks from the same root, its greater height and more slender growth, dichotomous racemose inflorescence, nearly sessile flowers and the veins of the calyx, which do not have branches running across from one to the other.

TREATMENT.

This plant is a winter annual or biennial. The seed sown in 1893 sprouted that year and the young plants lived over winter, and after producing flowers and seed in 1894 died *root* and *branch*.

Of course the best way would be to have seed inspected and reject all that contained the seeds of bad weeds. As this is not practical at present, farmers will be compelled to sow such seed as is offered to them and fight the weed pests that appear. With this particular one nothing could be done the first season. If the plants are prevented from seeding the second season that is the end of them. Some have gone to the trouble of pulling the plants up by the roots, believing the roots to be perennial. This was unnecessary, but the tops should be cut to prevent re-seeding.

Some of the specimens received about the first of August were fully seeded and the seed capsules open. If cut in that condition many of the seeds would be scattered. The plant should be cut as soon as the flowers begin to appear or before. The plant stools badly and each stalk bears several flowers and each capsule has numerous seeds. A few scattering plants would, if neglected, seed a field abundantly. We have had no experience, but doubt whether this weed would make hay. Those who have neglected to cut this weed carefully or have cut after the seed were ripe may expect to see it next season.

POTATO SCAB.

Botanists are agreed that this disease of the potato is caused by a fungus parasite, *Oospora scabies*, Thaxter. That the germs of a fungus will retain their vitality in the soil for several years.

That seed free from the disease will produce a scabby crop if planted upon soil contaminated with the germs.

That scabby seed planted upon soil free from the disease will produce a scabby crop.

That probably the disease is modified by the moisture, fertility, composition and mechanical conditions of the soil.

The source of the disease would therefore be either the *soil* or the *seed*. Conditions could never cause the disease; the germs must be present either in the seed or in the soil. To prevent contamination from the soil potatoes or beets should be grown upon *new* land, that has never grown potatoes, or if upon old soil, that which has not grown potatoes for a number of years. To prevent contamination from seed it should be selected from a field known to have been free from the scab.

If the origin of the seed cannot be determined then select the tubers that appear free from the disease, and soak them for an hour and a half in a solution of corrosive sublimate or Bordeaux mixture, to kill any germs present.

EXPERIMENT.

To test the efficacy of treating the seed with corrosive sublimate we took some potatoes that were slightly scabby and divided in two lots, one of which was treated two hours in a solution of 2 ounces to 16 gallons of water, and the other not. A portion of the untreated seed was planted, adjoining on each side of the treated. All was fertilized and cultivated the same. The soil had not grown potatoes for four years

The untreated seed came up before the treated and the tops appeared more vigorous during the whole season and obtained a fourth greater growth, and the weight of tubers was much more. All the potatoes were about equally scabby.

CONCLUSIONS.

1. That the germs of potato scab will retain their vitality in the soil for at least four years, as shown.

That if the germs are in the soil the treatment of the tubers with corrosive sublimate will not prevent the disease, and is apparently of no advantage.

That corrosive sublimate has a poisonous effect upon potato plants, depressing their vigor and lessening the yield, when the tubers are treated for two hours. (Our observations agree with those of Professor Taft, who says (Mich. Expt. Sta. Bull. No. 108) that treatment for longer than one and a half hours lessens the amount of scab but reduces the yield.

The only advantage then in the use of corrosive sublimate solution is when suspicious seed is to be planted upon nncontaminated soil.

FORMULA.

Dissolve two ounces of corrosive sublimate in two gallons of hot water and then add fourteen gallons more before using. *Remember that corrosive sublimate will corrode any metal vessel and a wooden receptacle should be used.*

Soak the seed in this solution for one and a half hours, dry, and it is ready to plant.

ENTOMOLOGY.

THE SNOW FLEA.

Achorutes nivicola, Fitch.

ORDER THYSANURA: FAM. PODURIDÆ.

Specimens of the above insect were received from B. Walker McKeen June 13, 1894.

This is the *blue black* insect found in such great numbers upon snow on warm winter days, and also at various seasons upon the surface of pools. They often congregate by the thousands upon tree trunks near the base. Those sent by Mr. McKeen were found near the base of an elm tree. These insects *hybernate* in grass about the base of trees and elsewhere, and about the bark of trees. On warm days in winter they come out. The name *Snow Flea* is usually applied to the above species though we have found four other species at Orono during the winter months upon snow. These and related insects are known by the name of *spring tails* because by means of a forked appendage attached to the abdomen they are able to execute leaps. The color is blue black or dark lead color, and the size from one-tenth to one-fifteenth of an inch.

THE SILVER FISH.

Lepisma sacharina, L.

ORDER THYSANURA: FAM. LEPISMIDÆ.

We received the following letter from Mrs. Johnson, accompanied by specimens which proved to be the above species.

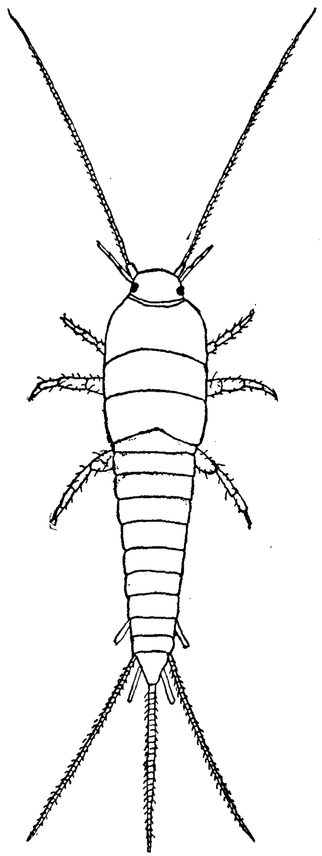


FIG. 5.

GORHAM, Me., Aug. 24, 1894.

F. L. HARVEY.

Dear Sir:—I have sent you three specimens of a bug (?) that has been troubling me this year. Some time in May a beetle, similar in shape to the illustration of the carpet beetle in this week's Lewiston Journal, appeared in the dish closets and on food when it was left exposed. In color it was a silvery gray. It was about a third of an inch in length. About the first of June they disappeared but soon after came in the form of the specimens which I have sent you. These are in everything — dishes, food, clothes, shoes, etc., but I have failed to find any real mischief which they have done.

Please write me what they are.

The buffalo bug is in at least one house in Gorham.

Yours truly,

ROSE C. JOHNSON.

The species of beetle spoken of was probably the common Meat Beetle, *Dermestes lardarius*.

This species may be recognized by the accompanying cut. The insect is of a uniformly dull silvery color, excepting the feet and antennæ, which are pale yellow. The size is about one-third of an inch. Mrs. Johnson has given the habits correctly. "They are in every thing." They are capable of doing considerable damage in libraries and wardrobes, by eating the paste from books, and holes in fabrics. They are very active. As these insects are fond of starchy or sugary substances, they could be destroyed by poisoned sweets.

This same species has also been reported from Brewer, Me.

THE RING-BANDED SOLDIER-BUG.

Perillus circumcinctus, Stäl.

ORDER HEMIPTERA. FAMILY SCUTELLERIDÆ.

We received through Mr. McKeen the following letter accompanied by a specimen of the above well-known parasite upon potato beetles:

BEAN'S CORNER, ME., August 6, 1894.

HON. B. W. MCKEEN, Augusta, Me.:

SIR—I send you herewith a bug that seems to like to stick his proboscis into the larvæ of the potato beetle and lie back and enjoy life as long as there is anything left in the larvæ. I presume you are acquainted with him, but he is a stranger to me. They do not seem to be numerous at present. Perhaps you would give his life history in one of your bulletins.

Yours resp'y,

GUSTAVE PEASE.

This is the first time this insect has been reported to the Station, and as we have not observed it in the State, it is desirable that it be known and protected as a friend to the potato grower. It is a beautiful insect and is sure to attract attention. It may be known by the following description.

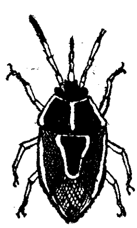


FIG. 6.
(Original.)

Length about one-half inch, width about one-fifth inch. Polished dark brown marked with cream colored bands as shown in the figure. The thorax and scutellum are coarsely punctured.

Head brown above and yellow beneath, mouth parts brown, antennæ five jointed, darker toward the ends, eyes black and prominent, proboscis four jointed, the terminal two black and also the base of the other two on the *under* side.

Thorax arched, polished brown, darker toward the head, bordered above on the sides and in front by a cream colored band which also extends down the middle of the thorax. The *pro thorax*, below, narrowly bordered with cream color and a narrow line of the same color down the middle mesathorax below, with a narrow yellow curved line in front of the second legs and down the center.

Scutellum bordered by a cream colored band.

Wings.—The hard portion bordered laterally by a cream colored band.

Abdomen bordered by a yellow brown band and down the center below a row of four blotches of the same color. The general color below, brown, legs brown, the tarse nearly black. The tibia on all the legs encircled in the middle by a band of yellow.

The mature insect enlarged about one-half is shown in Fig. 6.

THE ELM TREE BARK LOUSE.

Lecanium Caryæ, Fitch, var. *Canadense*, n. var.

ORDER HEMIPTERA: FAMILY COCCIDÆ.

Extract from a paper, by I. D. A. Cockerell, about to be published in the "Canadian Entomologist:"

Scale smooth, shiny, red-brown, convex, malleate but not or hardly plicate. Length 4, breadth 3, height 2 m m., varying to length 5, breadth 4, height 3 m m. (Some Maine specimens 6 m m. long.) Removed from the twigs, the scales leave an oval white mark. (Nappan scales are paler and more yellowish, also somewhat smaller. Posterior incision perhaps a little longer; scales also rather more tending to be plicate.) Male scale ordinary, rugulose.

With 6 jointed antennæ, formula 326154. 3 considerably larger than the remaining joints put together, 1 with 2 hairs; 2 with 2 hairs at its end, one especially long; 3 with 2 hairs near its end, last joint with several hairs, one especially long. (Nappan antennæ practically the same, but 1 larger; 4 and 5 each show a hair, 6 hardly so long, formula 3(126)54. Maine antennæ show one long hair at end of 3, 2 with 1 very long hair, 2 a little longer than 4, 4 a very little longer than 5, 6 a little longer than 2; formula 36245.) Derm obscurely tessellated, with large gland-pits. (In Maine specimens gland pits frequently in pairs.)

Femur not much larger than tibia. Tarsus hardly 1-3 shorter than tibia; distinctly swollen at base. Claw rather stout, curved at its tip like a falcon's beak. Digitules of tarsus apparently wanting (deciduous?) Digitules of claw large and distinct, extending well beyond tip of claw, stem moderately stout, knot large and oval. A bristle on end of coxa, one on end of femur and one on end of tibia. (Nappan scales show legs much the same, but femur proportionately longer, tarsus only a little swollen at base; tarsal digitules well developed, long, ordinary; digitules of claw short, not extending to end of claw; claw stout, nearly straight not hooked. Maine examples show coka stout, broader at base than its length, with a hair at its tip; trochanter with a long hair; femur longer than tibia, tarsus about 1-3 shorter than tibia; digitules all filiform.)

Eggs.—(Maine specimens) very pale pinkish.

Hab.—The types are from Stittsville, about 20 miles from Ottawa, Ontario, on *Ulmus racemosa*, sent by Mr. Fletcher. Other specimens are from Nappan, Nova Scotia, on elm (Fletcher) and Orono, Maine, on elm (Harvey). Prof. F. L. Harvey states that it is very abundant at Orono; he has known it for 8 years, and it is increasing. The branches are often almost covered with them.

The Stittsville examples are affected by a coccinellid and by an Encyrtid parasite, perhaps a *Chiloneuras*.

The species is quite different from the European *Lecanium ulmi*, and is doubtless a native of this country. It illustrates well the extreme difficulty of dealing with the American species of *Lecanium;* which have, perhaps, not succeeded in reaching a condition of specific equilibrium since the new developments, which doubtless followed the termination of the glacial epoch. It will be seen from the above, that the characters given are quite variable, unless we are dealing with three species instead of one—a view which I cannot for a moment entertain. While thus convinced that all these elm forms are strictly one thing, I have a very lively conviction that *L. ribis*, Fitch, is different—a conviction which I feel sure would be shared by any one who had seen quantities of both—yet it is difficult to point out the precise nature of the difference, apart from the smaller size of *ribis*. Two species of Fitch, *L. Cynosbati* and *L. Caryæ* have been re-described by Signoret, who shows that they have 6-jointed antennæ like *ribis* and *Canadense*. I have not seen authentic examples of either, but the description of *L. Caryæ* agrees so nearly with our elm species that I place the latter under it as a variety."

The above description refers to the bark-louse found so abundantly upon the elms in Maine and referred to in the introduction as The Elm Tree Bark-louse, which Mr. Cockerell describes as a *new variety*.

THE GOOSEBERRY PLANT-LOUSE.

Myzus ribis, L

ORDER HEMIPTERA: FAMILY APHIDÆ.

We have received from Mr. Delano Moore and other parties during the last three years, specimens of gooseberry twigs, in which the leaves at the end of the branches had been killed, resulting in the development of several short sub-terminal shoots, making a terminal dense cluster of short branches and small leaves. Careful examination of several specimens did not reveal any insect at work, nor could we find any evidence that the main shoot had been infested by either insect or fungous parasites. There were present in several specimens the moult skins of a species of aphis or plant-louse, which we presumed had to do with the injury.

The species mentioned above is known to infest currant and gooseberry bushes, causing the leaves to curl and blister, and though we were not able to identify the species from the molt skins, suspect it is responsible for the injuries.

To secure the insects for examination it will be necessary to search for them earlier in the season. The attention of those who have been troubled by these *terminal growths* on gooseberry bushes, is called to the matter. We would like to receive specimens earlier in the season. When the terminal leaves begin to show injury.

THE OBLIQUE-BANDED LEAF-ROLLER.

Cacœcia rosaceana, (Harris.)

ORDER LEPIDOPTERA: FAMILY TORTRICIDÆ.

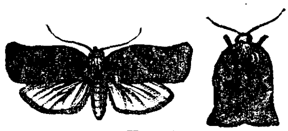


FIG. 7.
The moth of the oblique-banded, leaf-roller.

On June 11, 1894, we received specimens of the larvæ of this insect from Mr. Charles S. Pope, Manchester, Me. Accompanying the specimens were currant twigs showing the work of this insect. To make sure of the species we allowed the larvæ to transform.

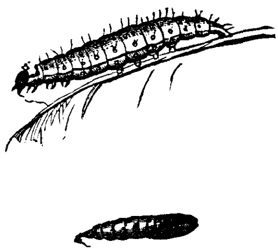


FIG 8.
Larva and pupa of the oblique-banded leaf-roller.

This insect is a general feeder having been found upon many species of the ROSE and SAXIFRAGE families and probably feeds upon the leaves of the plants of other families. The name leaf-roller applied to this insect is derived from the habit the larvæ have of rolling the leaves of the food plant into hollow cylinders in which they live.

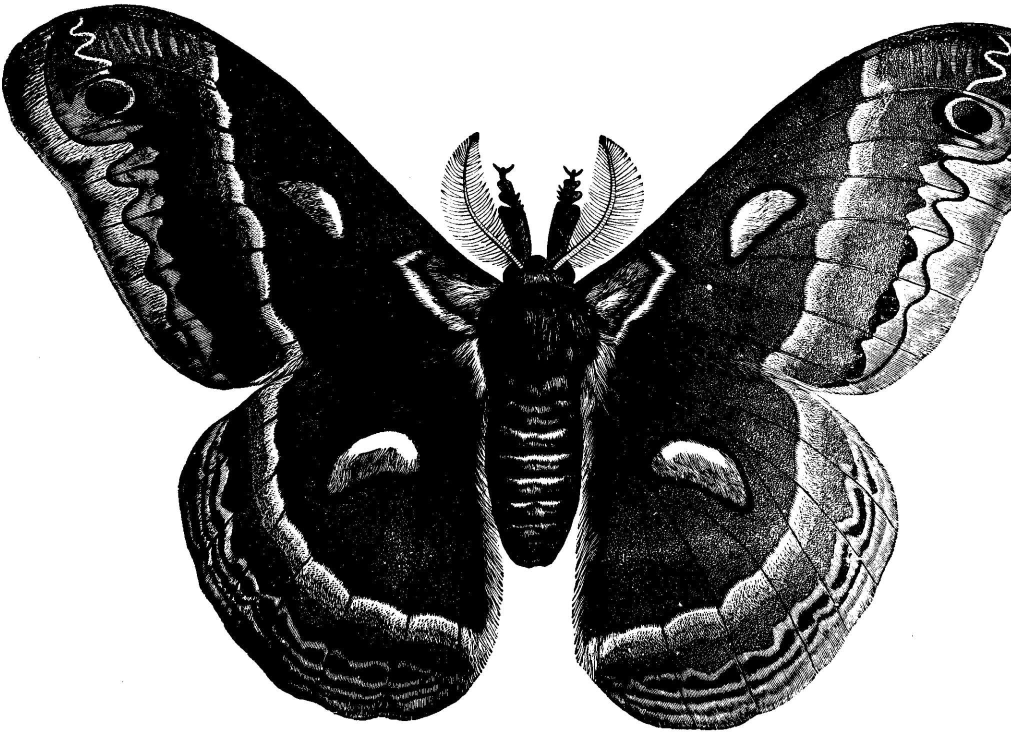
DESCRIPTION.

This insect may be known in the *larval* form by the pale green, yellowish green or reddish brown color with the head and top of first segment brown. There is a dark green stripe along the back and a few smooth dots from each segment bearing a short fine hair. The cut, Fig. 8 shows the larvæ somewhat enlarged. When full fed the larvæ changes to a chrysalis within the tube in which it lived.

The chrysalis is shown, Fig. 8. From the chrysalis the bell shaped moth shown in Fig. 7 comes forth.

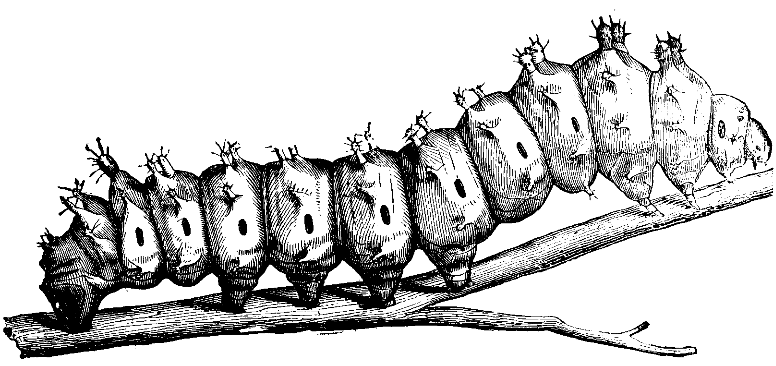
REMEDIES.

The clusters of rolled leaves should be pinched and the larvæ killed if within reach. Spraying with pyrethnum or Paris green would kill them.



c.

b.



a.

CECROPIA EMPEROR MOTH.

Platysamia Cecropia (Linn).

FIG. 9. (a) Larvæ. (b) Cocoon. (c) Moth.

THE CECROPIA EMPEROR MOTH.

Platysamia Cecropia, (Linn.)

ORD. LEPIDOPTERA: Fam. BOMBYCIDÆ.

Every season for the last eight we have received either larvæ cocoons or moths of the above species accompanied by letters of inquiry. We have concluded to publish cuts of all the stages of this conspicuous insect. Those who wish a description will find it in Expt. Station Rept., 1890, p 121. The insect is distributed throughout the State as specimens have been received from every section.

Fig. 9 a, represents the larvæ full size; Fig. b, the cocoon full size; Fig. 9 c, the full sized moth.

THE CHINCH BUG.

Blissus leucopterus, Say.

ORDER HEMIPTERA: FAMILY LYGÆIDÆ.

In company with Hon. B. Walker McKeen we spent two days last September in the vicinity of Fryeburg examining the area infected by chinch bugs.

HISTORY.

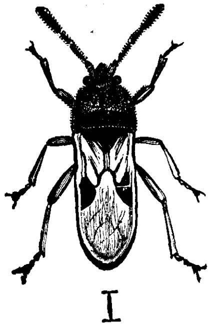


FIG. 13. CHINCH BUG. The short line below shows natural length.

By interrogating some of the oldest inhabitants we learned that this pest has done more or less damage in the intervale lands about Fryeburg for at least twenty-five years. It does not affect the area infested uniformly, but occurs in patches, often skipping entire farms. Nor is the infested area the same from year to year. Farms infested one season may become exempt the next and those not infested one season infested the next. Then there are seasons favorable for the bugs when the damage done is greater over the entire area and then seasons of minimum damage. The insects do

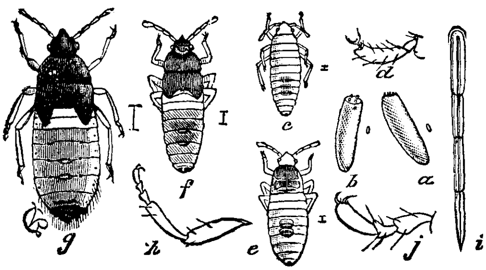


FIG. 14. CHINCH BUG, LARVA, PUPA AND EGG.

a and *b*, eggs; *c*, young larva; *d*, tarsus of same; *e*, larva after first molt; *f*, larva after second molt; *g*, pupa; *h*, leg; *i*, beak or tubular mouth; *j*, tarsus of mature bug.

not occur in such hordes as they do in the West even in the worst infested farms. In small fields there were many isolated patches of a few feet or rods in extent. Only in one or two places did we find large continuous areas infested. They were the worst in the low, sandy lands, but were found in some places on the uplands, notably on the farm of Charles Chandler, Fryeburg Center.

RECORD OF OBSERVATIONS.

We began our observations at the farm of Mr. B. B. Woodward, N. H., where we found the bugs in abundance, in small patches in grass lands. This farm is the *southern limit* of the infested area so far as we know, though they may be found farther south. Proceeding north we visited the farms of E. W. Burbank and Henry Andrews, where the insects were working in patches. The grass was dead and dry in one of these fields and the bugs were abundant on the edges of the dead patches extending their depredations. We burned over one of these patches to see what would be the effect on the bugs, and found that only a few of them were killed. They work so deep about the roots of the grass that the heat does not reach them.

At the farm of Charles Chandler, Fryeburg Centre, they were working upon the uplands and at George A. Charles' farm they had destroyed the whole field. At the farm of Wilson Webb they had been working in a field of corn. They had destroyed the adjoining grass land and injured a few rows of corn at the edge of the field. We found a large number of dead bugs covered with mold in the sheaths of the leaves but was not able to decide that the fungus was the cause of their death.

The fungus proved to be a common mold and originated, probably, in the juices exuded where the leaves were eaten and finally extended to the dead insects. So far as we could learn but little damage is ever done to corn by this pest. They were doing much damage on

John Hastings' land near the above corn field. At Dexter Walker's there was a fine field of corn adjoining grassl and badly infested. It would seem that they do not leave the grass for corn as long as the food supply holds out. Mr. A. K. Price had already plowed his grass land to destroy the insect. If the bugs are bad the land would have to be reseeded and by plowing early and deep, the bugs would be buried and destroyed. We called on Mr. Simeon Charles from whom we originally received specimens and found his fields infested. The most northern place ot their occurrence known to us positively is the farm of Albion Wyman, North Fryeburg, but we have good reasons for believing they occur about Bethel, twenty-five miles further north. They occur throughout East Fryeburg and also in Biidgton, the township on the east. We stopped at several other places than those mentioned and noticed the work of the bugs in several fields as we drove by. The above places mentioned will outline the infested area, which would appear to be about seven miles long by about two wide. Those who wish a description of this insect will find an account of it in Experiment Station Report, 1892, page 124, besides other information historical and remedial.

REMEDIES.

In Illinois and other western states where the chinch bug occurs in great numbers, over large areas, attempts have been made to destroy them by infecting with fungi, the principal one being (White Murcardine, *Sporotrichum globuliferum*, Speg.)

The results of these experiments have been so uncertain that we regard any attempt to control or destroy the pest by this method in Maine as time wasted. The fact that the insect works in isolated patches makes the problem in Maine a different and difficult one. In the West the bugs affect the wheat and small grain early in the season and as soon as this is harvested they migrate in hordes to the corn fields. In Maine small grain is not grown to any extent. Before haying the bugs live on the grass leaves and after haying do not migrate but transfer their depredations to the roots of the grass, killing everything as they go, remaining in the grass land as long as food supplies hold out. They are particularly destructive to timothy grass lands. Chinch bugs are very sensitive to wet weather and are never so bad in damp, rainy seasons.

The following suggestions may prove helpful in checking the pest:

1. Watch the fields after haying and if the bugs begin to work in patches as shown by dead places in the grass then *at once* spray the living grass for a distance of ten feet where the bugs are feeding along the edges of the patches with kerosene emulsion.

2. Should the bugs appear over the whole or the greater part of a field there is no hope of saving it but in order to destroy the bugs the land should be plowed deep and rolled as soon as possible after haying.

3. So far as possible it would be well to burn grass lands. The burning destroys some and the remainder are more exposed during the winter to injury. After haying or early in the fall all rubbish about the fences and border of the fields should be raked in heaps. The bugs will seek the rubbish for winter quarters. The rubbish should be burned late in the fall or very early in the spring.

4. The chinch bug feeds only on plants of the grass family. Fields badly infested could be planted to clover, buckwheat, beans, potatoes, turnips, etc., and the bugs starved. Frequent rotation of grass with the above crops would tend to keep them in check. If by concerted action all of the infested field in the area could be turned after haying the same season, it would go far toward destroying the pest. Whatever method is adopted there should be concerted action. The chinch bug does not travel very much and the application of remedial measures and its suppression becomes largely an individual matter. No farmer can lay the blame for its presence and depredations upon the inactivity of a shiftless neighbor.

THE BUFFALO CARPET BEETLE.

Anthrenus Scrophulariæ, L.

ORDER COLEOPTERA: FAMILY DERMESTIDÆ.

During the last few years we have received letters from the western and southwestern part of Maine regarding an insect doing much damage to carpets and woolen clothing. Several times these letters have been accompanied by specimens, leaving no doubt that the pest is the insect whose name appears at the head of this article. This insect is called the buffalo bug in Maine, but in other localities is variously known as the carpet beetle, buffalo carpet beetle and buffalo moth.

Perhaps the many common names given to an insect is of little importance, but they are confusing and are apt to annoy the systematist who insists upon exact use of terms. To the practical man the important points are identification; a knowledge of how to cope with it, if injurious, and how to utilize its good qualities if beneficial.

This insect belongs to the order Coleoptera, which embraces the hard-winged insects called beetles. To call it a "bug," which is the name belonging to insects like the squash bug (*Hemiptera)*, or to call it a "moth," which is a term restricted to a portion of the scaled winged insects (*Lepidoptera*) would be entomologically incorrect. This insect is properly called a beetle, and in allusion to the shaggy appearance of the larvæ, and the fact that it injures carpets the name Buffalo Carpet Beetle would be appropriate.

HISTORY AND DISTRIBUTION.

The insect was first described by Linnæus in 1758. On account of its feeding upon plants of the genus *Scrophularia* he named it *Anthrenus Scrophulariæ*. It is now known, however, to feed upon a wide range of plants including fruit trees, tulips and roses. Though a vegetable feeder by nature it readily changed its dietary and in Europe as early as 1779 was known to frequent houses and to destroy collections of insects and plants, clothes, furs, leather and victuals. It was known in Europe in 1855 as The Common Flower Beetle. It is an interesting example of the power some insects have of adapting themselves to new surroundings and new food.

Though known in Europe for over a hundred years, it was not detected in America until 1850, when Dr. Le Conte found a variety of it on flowers in California. It was, according to Le Conte, probably imported during the Spanish occupancy of that country. It was on the Pacific coast that it was rechristened "the buffalo bug."

In the Eastern states they were first discovered near Buffalo, New York, in 1872, and a little later in Massachusetts. Dr. Hagen investigated the matter in Boston, and found that the infested carpets came largely from a single large carpet house, and he inferred that the pest was introduced in imported carpets.

Since its introduction it has spread more or less, and is now known in all of the New England states, as far west as Illinois and as far south as Washington. In Europe it has not figured as a carpet beetle, as carpets are little used, and rugs more common. The insect is retiring in his habits and does not thrive in rugs, which are frequently taken up and shaken. Perhaps in the growing custom in this country of using rugs, housekeepers will find a means of controlling this insect, which is now in many localities the greatest household pest.

We have but little data regarding their introduction or even distribution or prevalence in Maine. Nearly eight years ago we received a single complaint, and presume they have been in the State for years. They probably came in from the way of Massachusetts through carpets purchased in Boston. We have had complaints from Bangor and Belfast, the eastern part of the State. This article, we hope, will call attention to the pest and bring it to light and help determine its distribution. We will be pleased to examine any carpet insects sent us, *but be very careful if specimens are sent to put them in a tight tin or metal box, which should be inclosed in an outer wooden or pasteboard box.* We would also like to have those who know positively that the buffalo carpet beetle is in their neighborhood send a postal card to that effect. There are several other small beetles that destroy carpets, also carpet moths, and besides other harmless small beetles are often found in houses, and are liable to be mistaken for this pest. The only safe way is to have the insect identified by an entomologist. Prof. Lintner gives a case where a beneficial beetle (a lady bug) was mistaken for the buffalo carpet beetle.

DESCRIPTION.

Eggs—We find no description of the eggs in any work at hand and have no specimens to examine. They must be very small, and the belief is that they are laid by the female on the carpet or clothing attacked and not in the cracks of the floor, as some suppose.

Larva—The full grown larva is about a quarter of an inch long, dark brown and clothed with stiff brown hairs which are longer on

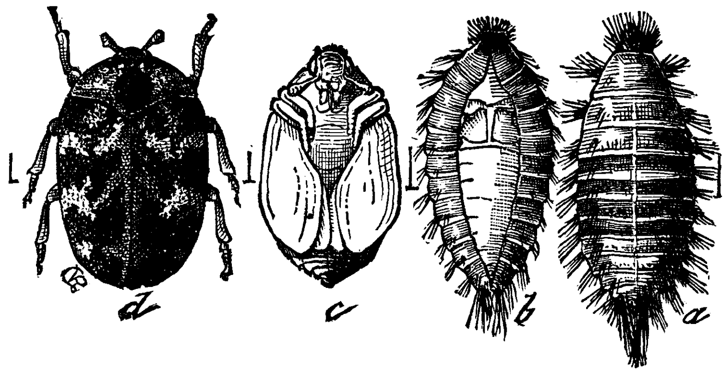


FIG. 10.

the sides than on the back and still longer on the extremities. These hairs form tufts at the sides and extremeties. The posterior end bears three tufts of long hairs and the head a bunch of shorter ones. Fig. A shows the back view of the larva much enlarged, the real size being shown by the hair line at the right. Fig. B shows the under side enlarged.

Pupa.—It is shown in Fig. c, enlarged. The real size being shown by the hair line at the left. It is brown in color and is the quiescent stage in the life history of the insect between the larva and the perfect beetle. The larva moults six times at least in coming to maturity, and finally the pupa is formed in the last larval skin, and after a time this larval skin splits open along the back, revealing the pupa from which later the full grown beetle emerges. The cast-off larval skins are usually found in abundance, giving the impression of a greater number of the pest than really exists. The larva are very tenacious of life and will go a long time without food. We kept some one time in a tin box for nearly a month without food, and they were still alive. When deprived of food the growth is slow and the moults more numerous. It is the larva that does the mischief.

Perfect Insect.—A beetle three-sixteenths of an inch long and nearly as broad. The broadly elipical outline is shown in Fig. a, which is enlarged, the real size of the beetle being shown by the hair line on the left. The beetle is black and white and scarlet. The ground color is black with three irregular white bands across the wing covers [elytra] and a scarlet stripe down the middle of the back widening at three points to meet the three irregular white bands. The antennæ are black, eleven jointed and bearing a three jointed club at the end. The head is black marked about the eyes and mouth by a few orange red scales. Under side of the body black with red and white scales. The color is variable. Sometimes the red band down the middle of the back is white and sometimes the two anterior white bands are confluent, forming a broad band of white.

LIFE HISTORY.

The beetles begin to emerge in the fall and continue to appear during the winter and spring. There is believed to be but one brood in a year, though the time of emergence of the beetles would depend upon the conditions of heat and cold and food supply in the houses and rooms frequented. In heated houses and rooms they would transform more rapidly, while scarcity of food has been shown to prolong the life of the larva and increase the number of moults. When on the wing they may be found often on window panes and in the fall out of doors upon plants of the sunflower and figwort families. Though Professor Riley thinks they lay their eggs in the house before they leave it we see no good reason why they may not, as they do in Europe, lay their eggs and maintain themselves out of doors. The beetles soon pair after they merge and the eggs are supposed to be laid upon the clothing and carpets effected. The eggs soon hatch, if the temperature is favorable, and the young larvæ attack the exposed edges of the carpet, clothing, etc., often following a single thread or stripe in a carpet for a long distance. When mature, in the fall, having moulted at least six times, they seek cracks in the floor or other places of concealment and transform to the pupa state within the last larval skin. The pupæ finally ruptures along the back and the beetles emerge, completing the round of life.

REMEDIES.

Difficulties.—This is a very difficult insect to exterminate, the despair of the shiftless housekeeper and nearly a match for the fastidious, uncomfortable ones who are ever upon the alert for the last speck of dirt and first indications of insect pests.

It does not readily yield to the ordinary insecticides like camphor, cedar oil, pepper, tobacco, turpentine, carbolic acid and pyrethrum, etc. Benzine when properly applied has been found to be the most convenient and best remedy. Even with this the most energetic and persistent measures are necessary. The aim should be extermination of the pest in the house, as a few overlooked would multiply rapidly and increase the difficulty.

Precautions.—[*a*] There are quite a number of carpet insects, beetles and moths. The first step should be the positive determination of the pest doing damage Learn to recognize the larvæ, pupæ and beetles and then wage a ceaseless war against them in every stage of their life history. If you do not know the insect, or can not decide from the description given above that it is the buffalo carpet beetle, then put some specimens in a tight metal box and send them to the entomologist of the experiment station at Orono, Me., and he will cheerfully name them.

[*b*] Remember that benzine is an inflamable liquid. Do not bring a light near it. Do not apply benzine to a room in the evening when lights are burning or enter a room with a light when it is filled with the vapor. It is well enough to keep a room closed while the benzine is being applied so it will not evaporate too rapidly. The strength of the vapor favors the destruction of the larvæ and beetles.

Having decided that you have the buffalo carpet beetle to grapple with, then apply the following remedies.

PREPARATION of ROOM.

As the larvæ crawl into cracks in the floor and under the baseboards to transform, precautions should be taken to fill, so far as possible, these hiding places.

a. Fill the cracks in the floor and the crevices at the bottom of the baseboards carefully with a moderately thick mixture of plaster of paris and water. This will set hard and prevent their entrance.

b. Should the use of plaster of paris be inconvenient or undesirable, then, by means of a hand-atomizer charged with benzine, puff the liquid thoroughly into all the floor cracks and crevices about the baseboards. It would be well to leave the carpets off a few days and make the second application of benzine before putting them down.

c. When cleaning house it is best to take up all the carpets at once, and thoroughly clean all the rooms before putting any of the carpets back. The common way of cleaning one room at a time and returning the carpet at once would give the pest a chance to fly or crawl from one room to another while the work is going on.

d. It has been recommended to put a strip of tarred roofing paper around the border of the room before the carpet is laid. This would no doubt help to repel the attacks of the beetles and would be desirable if the odor was not objectionable. The odor of napthaline, gasoline and bisulphide of carbon and kerosene make the use of these efficient remedies undesirable in the house. A tight box filled with the vapor of bi-sulphide of carbon from above is used by naturalists to disinfect museum specimens and it could be used to disinfect carpets out of doors. It is very volatile and highly inflammable. The vapor is very heavy, being two and a half times as heavy as air and settles rapidly.

PREPARATION AND CARE OF CARPETS.

a. In Europe this beetle is not known as a carpet pest because the use of carpets is not common. Rugs which can be taken up and frequently shaken are more in use than in this country. In a badly infected house it would be well, if possible, to discard the use of carpets for a time and use rugs, taking them up frequently and shaking them. A more extreme measure would be to discard carpets and rugs for the summer season. If carpets are used they should be taken up at least twice a year, thoroughly beaten and lightly sprayed with benzine and left out of doors until the benzine evaporates. Leaving carpets down the whole season and then cleaning them carelessly gives the pest fine chances to increase unmolested.

b. As the larvæ attack the exposed edges of carpets, they are usually found around the border of the room.

If the depredations of the insect are noticed between the times of house cleaning and it is not convenient to take up the carpet then take a damp, folded sheet or cloth and spread it smoothly over the infested spot and iron it thoroughly with a hot iron. Allow the iron to remain long enough to generate steam sufficient to penetrate the carpet and destroy the insects. If thought desirable the whole room could be so treated but the benzine method would prove less laborious. Some leave the carpet untacked and turn the edges back occasionally and examine them carefully.

c. When you buy a new carpet from a local dealer in the infested district, or import one from the larger cities, it would be well to examine it carefully and spray it with benzine before putting down. There is no doubt that the pest was introduced in carpets purchased in the city or cities where the pest has been found in the large carpet houses.

d. The custom of sending carpets to the cleaner has its danger as a cleaning house would be very apt to harbor the pest. When returned, carpets should be sprayed with benzine before putting them down.

e. Carpet cleaners in the infested district could easily arrange to give all carpets a dry hot air or steam bath of from 160° to 200° and thus thoroughly disinfect them after they are cleaned.

f. Carpets to be stored for the summer should be thoroughly beaten, disinfected by spraying with benzine and put into a tight box, the cracks of which have been previously sprayed with benzine. A box can be made tight by pasting paper over the cracks. Some line boxes with tarred paper and sprinkle napthaline crystals (*crysta alba*) in the fabric. This is better than camphor gum and is a good expellant, is cheap, and leaves no stains or offensive odors behind.

Care of Clothing.—Clothing to be stored should be treated as recommended for carpets. Drawers or boxes in which infested clothing has been stored should be thoroughly sprayed with benzine.

Furniture.—Cloth covered furniture should be thoroughly steamed or sprayed with benzine.

If the methods advocated above are carefully applied for two or three seasons, even so difficult a pest to exterminate as *Anthrenus Scrophulariæ* will be compelled to yield.

THE OAK-BARK WEEVIL.

Magdalis olyra (Herbst).

ORDER COLEOPTERA: FAMILY CURCULIONIDÆ.

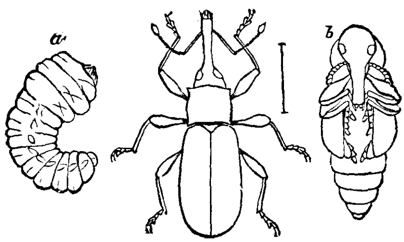


FIG. 11. Larva, pupa and beetle of Magdalis olyra.

Specimens of the above insect were received from Mr. B. Walker McKeen and sent him by Mr. Delano Moore of Presque Isle. They were said to be feeding on the leaves of elm trees in that region. This being a new habit for this species we wrote Mr. Moore asking him to send more of the insect and some of the leaves upon which it was feeding. Here we give a cut of one of the leaves showing the nature of the work. Mr. Moore writes that this species was also very abundant upon hazel bushes in June, destroying the leaves. We sent some of the beetles to Dr. Horn, who pronounced them the above species.

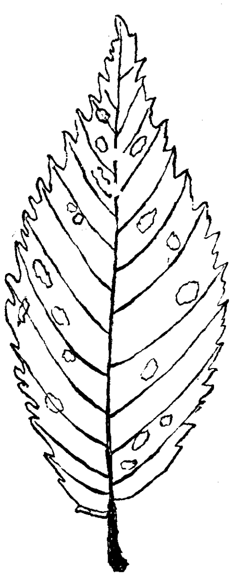


FIG. 12. Elm leaf eaten by Magdalis olyra (original).

Dr. Packard says [in Forest Insects, p. 80] that this species infests *oak trees*, the larvæ living under the bark. We do not know whether the larvæ attack elm trees or not, but possibly this is so, as the perfect beetle feeds on the leaves. This species can be recognized by the cut and following description: Color dark reddish brown to nearly black, clothed with short lighter colored hairs. The base and tips of femora and rest of the legs including the antennæ pitchy reddish. Length one-fourth to one-third of an inch.

We know no remedy. Should it confine its attacks largely to hazel bushes it would be more beneficial than otherwise.

THE FALL CANKER WORM.

Anisopteryx pometaria, Harris.

When we first began to observe this insect in 1887 it was not very abundant about Orono and did no material injury. It gradually increased from year to year and in 1893 had become so abundant as to do much damage to orchards and shade trees. The foliage of trees on the college campus and in Orono were so badly eaten that it was feared they would die. For some unknown reason, probably from the increase of parasites that prey upon this species, it almost entirely disappeared during 1894 and has given no trouble whatever about Orono in the summer of 1895. The insects seem to be migrating or passing over the State like a slowly moving wave from the north toward the south. Its depredations have gradually spread down the Penobscot valley. In 1893 they were very abundant in Arnold and Prospect and this season (1895) they are doing so much damage to the shade trees in Thomaston that a town meeting will be called to consider the means necessary to check them. Mr. E. P. George, President Thomaston Improvement Company, writes that "canker worms appeared upon a few of our fruit trees about four years ago. They have increased in numbers each year and gradually spread to the elms until this year fully three-fourths of the eight or nine hundred elms and fruit trees in the village were completely infested and deprived of their foliage by the end of June." The trees about Orono were not killed. They no doubt suffered a severe shock and the growth for a season or two was greatly checked but they seem to have regained their usual vigor. It took the worms about five years to reach the period of greatest numbers at Orono and if they have the same experience at Thomaston with them they will not be so abundant next season. It is well known to entomologists that insects have gradual periods of increase and then suddenly decline. We had a very good example of this in Maine in the case of the FOREST TENT CATERPILLAR, which is fully explained by rapid increase of parasites, (see Station Report 1890, page 138.)

Report of Veterinarian.

F. L. RUSSELL.

TUBERCULIN AS A DIAGNOSTIC AGENT.

No apology need be offered for a report relating to bovine tuberculosis. The importance of the subject is excuse enough.

Those who are impatient at the amount of attention the subject is receiving from all quarters need to realize its importance more fully than they do. It is doubtless possible to take extreme ground in advocating the importance of tuberculosis from a sanitary and economic standpoint, but the general public is so far from realizing the true importance of the matter that there is need of even these extremists. There is no safety in ignorance or indifference. Safety consists in recognizing existing dangers, and adopting the most efficient means of combating them. The world moves; and this is true even in relation to medical science and it has been especially true during the last ten years. Greater advance has been made in our knowledge of the causes of disease during the past ten years than in the fifty years preceding. And with the increased knowledge of the causes has naturally come a corresponding knowledge of the means of preventing and of curing disease. The magnitude of this progress, and its far reaching results in prolonging life and preserving health it is yet difficult to realize.

The most progressive and enlightened can hardly comprehend it, and it is in no way strange that the public that is to be directly benefited is somewhat slow to accept facts that are new and not well understood. Knowledge must always be in advance of practice, and there are never lacking those extremely conservative individuals who cling to the old until nearly everybody else has acknowledged the value of the new. These individuals have their place, no doubt, and act in some measure as a balance wheel, but progress is made in spite of them and not with their help. There are those even at the present time, who are decrying vaccination against small pox and insisting that it does more harm than good but vaccination is almost universally practiced in civilized countries in spite of them, and thousands of lives are saved by it.

Tuberculosis is by far the greatest scourge among diseases that has cursed this earth through all the past centuries as far back as history extends. As the effects of light, air, food and exercise upon the health of the individual have come to be realized many lives have been saved, and those sick, even with consumption, have been restored to health. But it was with the discovery in 1884 of the tubercle bacillus and the establishment of the fact that it was the active agent in producing all forms of tuberculosis that the foundation was laid for substantial progress in overcoming this disease. Whether it will ever be possible to cure a large proportion of cases is still in doubt, but it has become entirely evident that it is possible to prevent its attack. The deep seated convictions of centuries are not easily changed, and necessary means cannot immediately be put in operation. There has to be time for the popular intelligence to appreciate the need and the advantage to be gained. Considering that only a little more than ten years have elapsed since the important discovery I have mentioned, was made, great progress has already been made. Houses in which consumptives have lived are disinfected, some degree of isolation of tuberculous patients is attempted, and the food supply is watched that it may not carry disease. That these precautions are everywhere or even generally adopted, is not true, but they mark a decided advance and give promise of the time when, with a more general knowledge of the means to be used and greater appreciation of the advantage to be gained we shall have laws, well sustained by public sentiment, that will successfully control the spread of tuberculosis among man and beasts. When this time shall come many years will be added to the average duration of human life, and it would seem that the way is prepared for bringing about this desired end almost within the next generation. The time must come, and should come soon, when every case of tuberculosis shall be attributed to gross carelessness or almost criminal negligence in not using well recognized and reliable preventive precautions. In this regard we wish to deal with a phase of the subject that has vital relations to public health, and is also vastly important from an economic standpoint. However opinions may differ in regard to the absolute relation between human and bovine tuberculosis it is generally conceded that tuberculosis of cattle affects in some degree the public health, and if it were not for the pecuniary side of the question, there would not be the slightest protest against destroying every case of bovine tuberculosis as soon as it could be discovered by any available means. Some degree of danger to human beings from tuberculous cattle is generally conceded. The whole trouble when it comes to disposing of the three or four per cent of tuberculous cattle in Massachusetts or the one per cent more or less of tuberculous cattle in Maine, hinges on the matter of expense. It is human lives in the balance with property, and where it is my property against some one else's life, the property consideration is apt to outweigh human life. There is a disposition to ignore, or make light of the danger and magnify the loss. What is needed is a more general appreciation of the danger, which is certainly real, if not as extreme as the most radical would claim; and the pecuniary loss from the destruction of a few hundred head of sick and comparatively worthless cattle would have little weight. To entirely eradicate human tuberculosis within any given time is impossible. We can't and don't want to use the necessary means; this will be a work of generations and almost entirely along the line of prevention, and the extermination of bovine tuberculosis would be a long step in that direction. But with the means now at our disposal it is perfectly feasible and when rightly viewed I believe it will be considered highly desirable to free this country of human tuberculosis within ten years. We have simply to destroy the comparatively small number of animals that are now diseased, disinfect the places where they are stabled and institute a system of periodical inspection that need be neither cumbersome nor expensive compared to the great end to be gained. Half way measures which simply attempt to control must prove more expensive in the end and not nearly as satisfactory in the results. I know the claim is made that, if all tuberculous cattle were destroyed, it would be but a little time before there would be just as many: but this does not seem to me reasonable. We know that individuals have cleaned tuberculosis out of their herds and kept it out and what is possible for an individual is possible for a community of individuals. The same system of inspection that will enable us to get rid of tuberculosis in the first place will render it possible to keep rid of it. Besides human consumptives will not always be allowed to spread disease broadcast and with all tuberculous cattle destroyed there would be the chief danger to our herds.

Until within very recent years when there has been any attempt to exterminate bovine tuberculosis there has been an insurmountable difficulty in the impossibility of discovering cases until considerable advance had been made. Diseased cattle might remain in a herd for years and their true condition not even be suspected. Although nearly every state has enacted laws for the purpose of controlling or exterminating bovine tuberculosis no apparent headway has been made. There would seem to be as many tuberculous cattle now as ever. To be sure no serious attempt has been made to thoroughly exterminate the disease in any large territory for it has been a recognized impossibility and it is doubtful if the results from the work done have justified the expense, whether they have or not is certainly open to discussion. The destruction of an animal that has already thoroughly infected her surroundings with disease germs and with only a short natural leave of life remaining may be of doubtful importance. She has probably already done most of the harm she is capable of. With the discovery of tuberculin and its effects upon tuberculous cattle we entered upon a new era. What was before so nearly impossible as to discourage effort becomes comparatively easy and it will be strange if during the next ten years we do not see more advance made in getting rid of bovine tuberculosis by the aid of the diagnostic properties of tuberculin than would have been possible in any length of time if dependence had to be placed on a physical examination. In regard to the value of the tuberculin test in diagnosing tuberculosis there can now be no question. The only wonder now is that there should be any opposition to its use or that dependence should longer be placed in a physical examination. But extremė conservatism or ignorance of the comparative value of the tuberculin test probably accounts for it. It is my purpose in this report to review some of the results obtained by the use of tuberculin as compared with a physical examination. Our own experience in the use of tuberculin covers more than three years. We have held autopsies on thirty-two cows, heifers and bulls that reacted under the test, and, although we claim a fair degree of skill in making a physical diagnosis, there were not over ten of these animals that we would have condemned from a physical examination alone, yet with possibly two exceptions they all exhibited tuberculous lesions. In two cases where it was necessary to hold a very hasty autopsy by lantern light no lesions were found. At the state college of Pennsylvania the college herd was given a physical examination, and tested with tuberculin, by two different parties. Only one case of tuberculosis was found by a physical examination, and four by the tuberculin test. One cow that seemed to be tuberculous from a physical examination proved to be suffering from a slight disorder of an entirely different nature. Since last October cattle taken to the Brighton and Watertown markets have been tested with tuberculin by the veterinarian of the Boston Board of Health and destroyed at the owner's loss when found diseased, so it is safe to assume that only apparently sound cattle have been sent there since that time. During the first six months over one hundred animals were condemned and the autopsies showed that 79 per cent were tuberculous, and of sixty-three beef cattle passed as sound and slaughtered, four were found to be tuberculous. Here we have the tuberculin test applied under the most unfavorable conditions upon cattle just arrived from a long journey and surrounded by all the disturbing influences of an open market, yet the result must be considered very favorable to the tuberculin test as compared with any physical examination.

The biologist of the New Jersey Experiment Station, Professor Julius Nelson, reports that of the forty-three animals of the college herd examined by him, reactions were obtained in twenty-eight cases and at the autopsies twenty-five were evidently diseased. The other three, one cow and two heifers were apparently sound but he says the temperature of these three varied so little from the normal that he was in doubt whether they reacted or not, and he killed them on mere suspicion. This same herd was subjected to a careful physical examination before the tuberculin was used and fifteen animals selected as diseased, three of which proved to be sound. Dr. Austin Peters in an address delivered in Boston recently assumes as a result of his observation that only a quarter or a third of the cases of tuberculosis revealed by means of tuberculin would be discovered by a physical examination. Dr. Laws of Cornell, a very conservative man, says in a bulletin published a little more than a year ago. "When the State aims at a thorough extinction of the disease (tuberculosis) in our herds this test (tuberculin test) cannot be omitted as it is absolutely essential to success," and what he says in regard to the extinction of tuberculosis from a state has equal force when applied to a herd.

In regard to the effect of tuberculin upon healthy cattle, in a recent bulletin Dr. Laws produces testimony based upon his own experiments and those of the United States Bureau of Animal Industry that shows, as far as these experiments go that the injection of a test dose of tuberculin into a healthy cow, even if repeated several times, has no appreciable effect upon the productiveness or health of the cow. This has also been the experience of nearly all who have applied the test. Cows that have been tested suffer from the same troubles that affect other cows and there is no ground for connecting these troubles with the test that has been made.

In Bulletin No. 42 of the Vermont Agricultural Experiment Station the history of tuberculosis in the Vermont State College herd is given. The first of January, 1894, all but two animals out of a herd of thirty-three were in apparent health. These two had been in an unthrifty condition since coming from the pasture in the fall; tested with tuberculin twenty-four animals reacted and the post mortem confirmed the test. Two animals that failed to react were killed and showed no disease. In the same bulletin it is stated that the station veterinarian during the first six months of last year made over a thousand injections of tuberculin and two hundred and twenty-two animals were found diseased. Two hundred and twenty of these were slaughtered and found tuberculous. Nothing is said about the other two. This is a very remarkable record and does much to confirm the value of tuberculin in detecting tuberculosis. Most of these cases were found in two badly infected herds and of six hundred and sixty-two animals tested, only thirty-nine cases of tuberculosis were found. In Bulletin No. 27 of the Massachusetts Hatch Experiment Station Dr. J. B. Paige gives the results of his experience with tuberculin. The entire college herd was destroyed at different times, the last of them in January, 1894. At this time thirty-two animals were killed, twenty-five of these reacted under the tuberculin test and were found to be tuberculous. The other seven were sound. Of the twenty-five tuberculous animals in no case had the physical symptoms so developed that by any ordinary examination a diagnosis of tuberculosis could have been made. Among the conclusions with which Dr. Paige closes his bulletin are these:

"The diagnosis of most cases of this disease by physical examination is impossible."

"That in tuberculin we have an exceedingly delicate and reliable test for tuberculosis"

"That in tuberculin we have the only means by which we can eradicate tuberculosis from among our cattle."

We might go on to almost any length in giving the results of the use of tuberculin in detecting diseased cattle, and they would all give testimony in the same line as this already given. Many thousands of cattle have been tested in this and other countries by hundreds of different men and the results have been surprisingly uniform. The most unfavorable results we have been able to find any record of were those obtained by the Boston Board of Health at Brighton and Watertown. We have already noticed the conditions were not such at these places as to warrant us in expecting satisfactory results, but they were in a large measure satisfactory, certainly much better than could have been obtained by a physical examination.

The following is from a bulletin by Dr. E. P. Miles published by the Virginia Agricultural Experiment Station.

"The laws necessary to control the disease (tuberculosis) in bovine animals and lessen the mortality in man may be briefly stated as follows:

1st. The most important of all, the establishment of a state board of health, one member of which shall be a qualified veterinarian.

2d. The appointment of a qualified state veterinarian, who shall be an *ex-officio* member of the State Board of Health and work under its direction.

3d. A liberal appropriation placed at the disposal of these officers, in order that they may effectually carry out their work.

4th. The establishment of public abattoirs, and compelling the slaughter of all animals for meat at these places.

5th. Providing for veterinary inspection of all animals slaughtered for meat; also veterinary inspection of all public dairies.

6th. The provision of some means to compensate owners of all condemned animals.

7th. A law empowering the State veterinarian to order the destruction of all condemned animals.

8th. The provision of county hospitals for indigent tuberculous people.

9th. Compulsory disinfection of all premises that have been occupied by tuberculous people or animals.

10th. Compelling the disposal of the carcasses of all tuberculous animals by cremation.

11th. Prohibiting tuberculous people from attending public gatherings in closed buildings.

With these laws in force, tuberculosis can be practically stamped out.

Science is arrayed for the battle; all that is lacking is the declaration of war on the parts of the states and government."

APPENDIX.

The following report on the prevention of bovine tuberculosis was presented to the Massachusetts Veterinary Association, and after thorough discussion and revision, it was finally adopted by the association at a meeting held on November 28, 1894.

Realizing the importance of preventing the extension and continuance of bovine tuberculosis among our dairy herds, the Massachusetts Veterinary Association has prepared the following brochure in the hope that it may assist in spreading information on the prevention and eradication of this disease.

In referring to tuberculosis the following questions are often asked by stock owners: (1) How shall the occurrence of tuberculosis be prevented in a healthy herd, and (2) how shall tuberculosis be eradicated from a herd that is already diseased?

In considering these questions it should be borne in mind that while it is a fact that, no matter how unhealthy the surroundings, bovine tuberculosis cannot exist without the presence of the bacillus, yet it is equally a fact that the germ requires a suitable soil for its development, and that a favorable condition of the body for the development of tuberculosis frequently results from hereditary predisposition, unsanitary surroundings and the injudicious management to which dairy cattle are so often subjected. It follows then that anything that tends to undermine the health of the dairy stock should be avoided and a continual effort made to strengthen and build up the constitution of the dairy cow.

The following recommendations are made to stock owners to prevent the occurrence of tuberculosis in a healthy herd:

1. As far as possible owners should raise their own stock and endeavor to improve the constitution of the herd by breeding only from animals that are strong constitutionally and known to be free from any tuberculosis taint.

2. When practicable all farmers should own a bull. They should restrict its use to their own cows, and not allow it to come in contact with other stock.

3. Allow no strange animal to come in contact with the herd without first making sure by tuberculin test (which is now recog-

nized to be the only practical method of diagnosis) that they are free from disease.

4. Never buy from infected or suspicious herds.

5. Never purchase a cow with a cough or abnormal breathing, lumpy or diseased udder, swollen joints, or with a tendency to scour or bloat.

6. Overcrowding in barns should be avoided. Provide as much air space as possible, allowing at least 1,000 cubic feet for each animal.

7. Pure air and abundant sunlight are essential to the preservation of health in animals. Windows hinged at the bottom and dropped slightly inward at the top may be utilized for light and ventilation. In this way the air is directed upward, thereby preventing a current of cold air on the cattle.

8. In fair weather cattle should be in the open air as much as possible.

9. All barns should be kept as clean as possible. They should be sprinkled before being swept, and in consequence of the irritating and infectious character of the dust of stables in which tuberculous animals have been kept, sweeping should always be done while the cattle are in the yard.

10. In consequence of the danger to cattle from consumptive expectorating in and aronnd barns, no consumptive person should be allowed to have charge of or come in contact with the dairy cattle.

11. Do not keep manure in the cellar. Better have no cellar, but where one exists it should be well drained, well lighted and well ventilated.

12. Manure should be frequently removed from the neighborhood of barns.

13. The barn yard and its surroundings should be well drained and free from standing water and filth.

14. Early breeding, late and continuous breeding, as well as excessive and injudicious feeding and milking, are all frequent predisposing causes and should be avoided.

With reference to the eradication of the disease in herds already affected, it is recommended that a thorough examination of the herd be made, using tuberculin test.

All animals found diseased should be slaughtered and the remaining animals retested at intervals. The thorough disinfection and renovation of all infected barns is imperative and good drainage, light and ventilation should be secured.

Where these conditions cannot be obtained it would in many cases be more economical and satisfactory to build new stables, always observing the recommendations suggested for healthy herds.

ALEX. BURR, M. D. V.,
JAS. B. PAIGE, D. V. S.,
JOHN M. PARKER, D. V. S.,
Committee on Tuberculosis.

In a bulletin lately published in the United States Bureau of Animal Industry, the following methods of disinfection are recommended:

(a) Corrosive sublimate (mecuric chloride,) one ounce in about eight gallons of water (one-tenth per cent.) The water should be kept in wooden tubs or barrels and the sublimate added to it. The whole must be allowed to stand for twenty-four hours, so as to give the sublimate an opportunity to become entirely dissolved. Since this solution is poisonous it should be kept covered up and well guarded. It may be applied with a broom or mop and used freely in all parts of the stable. Since it loses its virtue in proportion to the amount of dirt present, all manure and other dirt should be first removed and the stables well cleaned before applying the disinfectant. After it has been applied the stable should be kept vacant as long as possible. Before the animals are allowed to return it is best to flush those parts which the animals may reach with their tongues to remove any remaining poison.

APPENDIX.

Bulletins Issued in 1894.

BULLETIN No. 6.

FRUIT CULTURE—VARIETIES.

By far the most important branch of fruit growing in this State is that of orchard culture. Soil and climate seem especially adapted to producing apples of the highest quality and appearance, while rocky hillsides, unfit for the general operations of agriculture, are often found to produce the finest fruit. Pears and plums receive but little attention except in isolated localities, while cherries are still more neglected.

The rapidly increasing number of visitors to our State during the summer months, with the consequent increased demand for fresh fruits and vegetables opens a home market for horticultural products which is very encouraging. It therefore seems advisable that the Experiment Station should obtain and disseminate such information as shall be most helpful in building up the several branches of horticultural work.

As is well known, Maine apples have a world wide reputation for quality and beauty. It remains for us to plant such varieties as are likely to prove most valuable; to give the best possible culture to our orchards; to prevent, so far as possible, the attacks of diseases and insect enemies; and to sort and pack our fruit honestly.

Plum growing, which formerly received considerable attention, especially in the Penobscot valley, is again being undertaken in certain sections of the State. It is a remarkable fact, however, that nearly seventy-five per cent of the plum trees reported in reply to recent inquiries, are grown in Aroostook county. If plum growing can be made profitable in those sections of the State where winter protection of the trees is absolutely essential, there would seem to be no good reason for its neglect in other sections which have equally good soil, far more favorable climate, and more available markets. The most serious enemy of the plum grower is the Black Knot, and it is only by concerted action on the part of growers that this disease can be held in check. In New York and some other important plum growing regions, stringent laws have been passed for the protection of the fruit growers, and it is hoped that in the near future similar action may be taken by our own legislature.

Small fruits, especially currants and gooseberries do not receive the attention their importance demands. Both of the fruits named delight in the cool, moist climate afforded by our high latitude and proximity to the ocean, while they are easy of culture and are always in demand at good prices. Strawberries, too, coming as they do after those from Massachusetts and New York are out of the markets, and just as the people are flocking to our summer resorts, offer a promising field to the enterprising fruit grower.

With the above facts in mind, the subjoined list of varieties (condensed from a catalogue of the fruits of the State which will be published in full in our annual report) is sent out as the first of a series of short bulletins on fruit growing; methods of culture; enemies and diseases of fruits; and the varieties best suited to different sections of the State.

The widely varying conditions existing in different parts of the State render a general statement as to the value of any given variety for the State only approximately correct. Varieties which may be of merit in the southern portions of the State are not sufficiently hardy for the middle and northern counties. On the other hand, some sorts considered specially valuable in Aroostook county, are unknown in York.

The following schedules of varieties for the different sections named, are presented after carefully considering the recommendations of leading fruit growers in those sections:

For Aroostook, Piscataquis, Northern Somerset, Penobscot and Washington counties:

APPLES.—Alexander, Dudley's Winter (North Star,) Fameuse, Hayford Sweet, Oldenburg, Yellow Transparent, Wealthy and the

Hyslop and Lady Elgin Crabs. The number of varieties tried and found wanting would form a much longer list.

PEARS.—Only the most hardy will succeed. Fulton, Eastern Belle, Nickerson, and Vermont Beauty are suggested. Pears have not as yet been grown to any extent.

PLUMS —Damson, Green Gage, Moore Arctic, Smith's Orleans. Of these, Moore Arctic is by far the most valuable, though not of high quality.

SMALL FRUITS.—Agawam blackberry, Cuthbert and Tyler raspberries; Fay and White Grape currants and the Houghton gooseberry lead.

Many other varieties, both of orchard fruits and of small fruits are under trial for this northern region at the present time, and the results obtained will be reported in due season.

For Oxford, Kennebec, Waldo, and the southern counties:

APPLES.—Baldwin, Ben Davis, Gravenstein, Hubbardston, Jewett Red (Nodhead), Mother, Northern Spy, Oldenburg, Red Astrachan, Rhode Island Greening, Tallman Sweet, Yellow Bellefleur.

PEARS.—Angouleme, Anjou, Bartlett, Clapp's Favorite, Lawrence, Louise Bonne of Jersey, Sheldon.

PLUMS.—Bavay, Imperial Gage, Lombard, McLaughlin.

CHERRIES.—Black Heart, Downer's Late, Governor Wood, Early Richmond, English Morello.

RASPBERRIES.—Cuthbert, Golden Queen, Shaffer, Gregg.

BLACKBERRIES.—Agawam, Snyder.

CURRANTS —Fay, Versaillaise, Victoria, White Grape.

GOOSEBERRIES.—Downing, Houghton, Smith.

STRAWBERRIES.—Bubach No. 5, Crescent, Haverland, Sharpless, Wilson.

GRAPES —Concord, Green Mountain, Hartford, Moore's Early, Worden.

The above named varieties are the ones most commonly grown at the present time. It is believed that many of these varieties (especially of the small fruits) will soon be superseded by some of the newer introductions, even as the Hovey strawberry, Knevett raspberry, and Dorchester blackberry have given place respectively to the Crescent, the Cuthbert and the Agawam.

A catalogue of all the varieties known to be cultivated in the State with a concise description and the approximate value of each will be published in our annual report for 1893. A copy of this report will be sent to those requesting the same.

W. M. MUNSON,
Horticulturist.

MAINE STATE COLLEGE,
ORONO, ME., Jan. 8, 1894.

BULLETIN No. 8.

SPRAYING EXPERIMENTS.

Spraying with some solution of copper as a protection from the attack of apple scab is coming to be looked upon as a necessity by many of the more progressive orchardists. During the past three seasons the writer has been engaged in solving some of the problems incident to this work. The results, so far as obtained, have been detailed in the annual reports of the experiment station.*

The principal work of the present season was a comparison of the effectiveness of different mixtures. The failure of certain trees, set apart for that purpose, prevented reaching more definite conclusions regarding the best time for spraying.

The materials used in the work here mentioned, were as follows:

1st. *Modified eau celeste.*—2 lbs. copper sulphate, 2 1-2 lbs. carbonate of soda, 1 1-2 pts. ammonia and thirty-five gallons of water.

2nd. *Bordeaux Mixture.*—6 lbs. copper sulphate (Blue Stone), 4 lbs. fresh lime, dissolved separately, then mixed and diluted to 40 gallons.

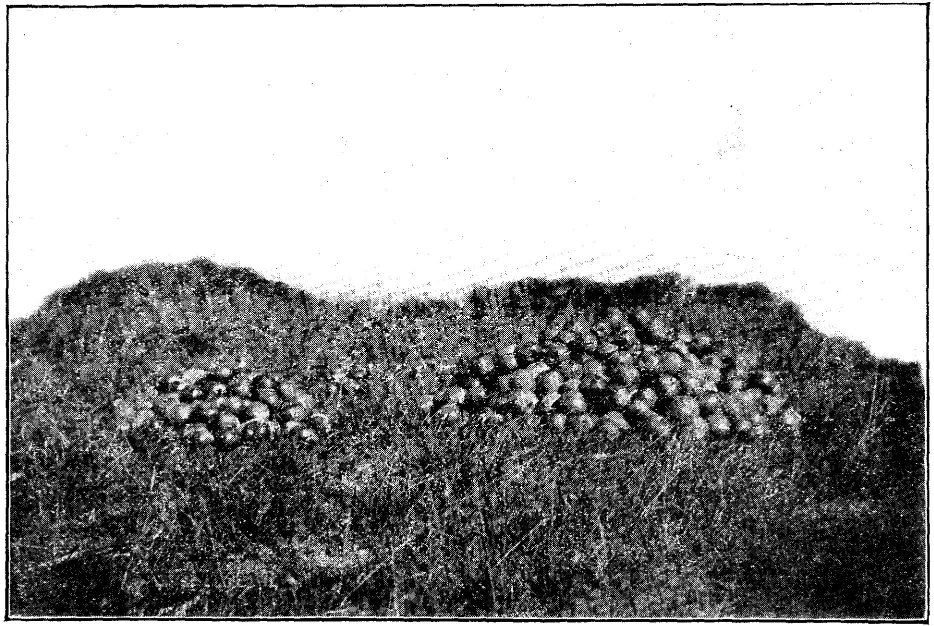
3. *Bordeaux Mixture and Paris Green.*—Same as No. 2 with addition of Paris green in the proportion of 1 lb. to 250 gallons.

4th. *Paris Green.*—1 lb. Paris Green in 250 gallons water.

The season was very dry and the trees were much freer from scab than in previous years. That there was marked benefit from the treatment is, however, shown in the accompanying photographs of fruit from contiguous trees and also in the table.

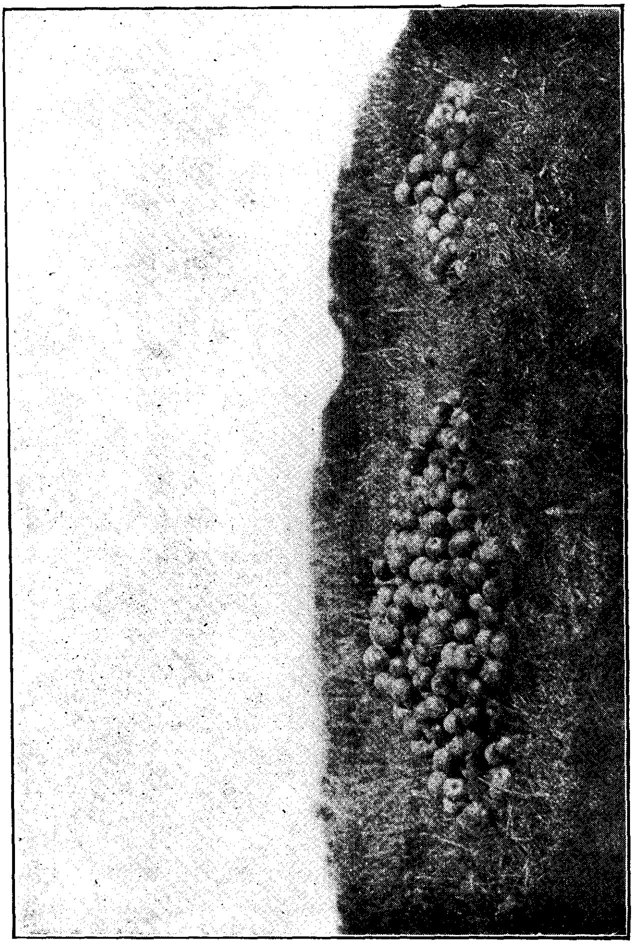
*Rep. Maine Exp. Sta., 1891, p. 112; 1892, p. 92.

No. 1.—NOT SPRAYED.



Free, 130. Badly scabbed, 17. Slightly scabbed, 592.

No. 2.—SPRAYED.



Free, 474. Badly scabbed, 3. Slightly scabbed, 114.

RESULTS OF SPRAYING TO PREVENT APPLE SCAB. 1893.

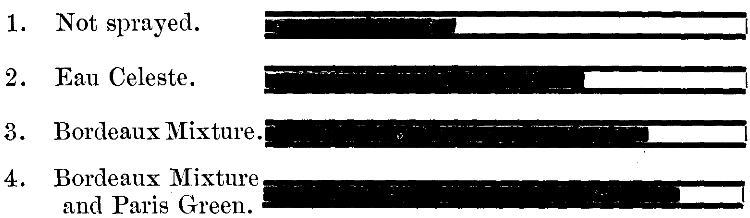
Check trees (not sprayed), -	38.3 per cent. free from scab.
Eau celeste, sprayed four times,	72.8 " " " " "
Bordeaux mixture, sprayed four times, - - - -	79.9 " " " " "
Bordeaux mixture and Paris green, sprayed four times, - -	82.8 " " " " "

The above figures are the average results obtained from an examination of the fruits of three trees of each class. Much of the fruit classed as "slightly scabbed" in our examinations, hence not considered in the above figures, would grade as "No. 1" fruit. As is well known, however, the fungus grows rapidly after the fruit is packed, hence the rigid adherence to our arbitary distinction.

As shown by the table, the best results were obtained from the use of a combination of Bordeaux mixture and Paris green—a fact which would indicate a possible fungicidal value for Paris green. That this value is slight, however, was shown by some trees sprayed with arsenite only.

The modified *eau celeste*, while less effectual than Bordeaux mixture in preventing scab, was also found to injure the foliage unless used with caution. The fruit also was made somewhat rusty, the epidermis apparently being injured by the ammonia.

The relative value of the different materials used may best be illustrated by the following diagram, the shaded portion representing the per cent. of fruit free from scab:



A Brief Retrospect.

For the benefit of those who have not received previous reports, it may be well to give a brief resume of the results obtained from three seasons' experiments.

We have seen that apple scab is caused by a parasitic fungus which attacks the leaves and young twigs as well as the fruit, and that the growth of the tree may be seriously checked. Spraying the trees with certain compounds of copper has been found an effective means of holding the disease in check,—the increase of salable fruit, as a result of spraying, often amounting to 50 per cent.

Indications point strongly to the value of spraying early in the season, before the blossoms open, and of repeating the application four or five times during the season.

The best results have been obtained from the use of Bordeaux Mixture, prepared as follows:

6 pounds copper sulphate (Blue Stone),
4 pounds quick lime,
40 gallons water.

Dissolve the copper in a pail of hot water; slake the lime in another vessel; mix and dilute as above for use.

Farmers are advised to club together in the purchase of apparatus and chemicals, thus reducing expense.

Necessary chemicals may be obtained in large quantities of:

Weeks & Potter Co., Boston.
Eimer & Amend, 205 Third Ave., New York.
W. S. Powell & Co., Baltimore, Md.

Most of the materials may be purchased in small amounts at the local drug store.

Force pumps and other apparatus for spraying may be obtained of any of the leading manufacturers, as:

Field Force Pump Co., Lockport, N. Y.
Gould's Manufacturing Co., Seneca Falls, N. Y.
W. & B. Douglass, Middletown, Conn.

The most satisfactory nozzle we have used is the "McGowen," manufactured by John J. McGowen, Ithaca, N. Y. Our second choice is the "Climax," manufactured by the Nixon Nozzle and Machine Co., Dayton, O.

W. M. MUNSON.

MAINE STATE COLLEGE,
Orono, Me., March 1, 1894.

BULLETIN No. 9.

TOMATOES.

Much of the work with tomatoes during the past season was in continuation of experiments previously undertaken, and related principally to methods of culture. The following condensed notes will indicate in a general way the conclusions reached.

1. *Effect of Early Setting*:—Duplicate lots of plants were given the same treatment early in the season. One lot was removed to the field May 23, the other a week later. The first lot was severely checked by frost May 27, but in spite of this fact the plants recovered and there was practically no difference in the yield of the two lots. The slight variation found, was in favor of the early set plants.

Conclusion:—Indications still point to the value of early setting of tomato plants.

2. *Value of Pot Culture:*—The importance of careful handling of tomato plants has previously been emphasized by the writer. During the past season a test was made as to the value of growing plants in pots previous to setting in the field. Twelve plants of each of four varieties were transferred from the seed flats to thumb-pots, later to 3-inch, and then to 4-inch pots, and to the field June 1st. Duplicate lots were handled in boxes in the ordinary manner on the same dates.

In every instance the plants handled in pots produced a larger number of fruits and a greater total weight of the product than those from boxes; but the individual fruits were slightly smaller.

Computing the yield per acre on the basis of the weight of fruit picked previous to October 1st, and considering the plants placed five feet apart each way, we found for the first three varieties, a difference of more than 29 bushels each, in favor of the pot grown plants. This difference at 75 cts. per bushel, (none of our fruit sold for less than 60 cts. per bushel, and early in the season we received $1.75 at wholesale,) would amount to $21.83 per acre, a sum far in excess of the cost of pots and expense of handling.

Conclusion:—There appears to be a marked increase in the productiveness of plants handled in pots previous to setting in the field.

3. *Individual Variation:*—Very often a new variety is recommended, or a particular method of culture is advocated, because excellent results have been obtained for a single season. The danger of drawing conclusions from such limited experience, was pointed out by the writer last year, when it was found that "in no case were the results from duplicate tests uniform."*

Duplicate lots of each of three varieties of tomatoes were grown during the past season. All of these were given the same treatment in the house, and were planted side by side in the field, receiving the same culture. The results obtained, bear out our former conclusions to such an extent, that the results of certain methods of culture undertaken, are withheld for further verification.

The weight of individual fruits was practically uniform, but the variation in number of fruits, and in the consequent weight of the product, was very marked. The date of ripening was also variable.

Conclusion:—The individual variation of plants of any given variety is often such as to obscure any effects of different methods

* Rep. Maine Exp. Sta. 1892, p. 64.

† Rep. Maine Exp. Sta. 1892, p. 65.

of culture, and render conclusions drawn from a single season's work very unreliable.

4. *Crossing*:—The work of developing a tomato which shall be of sufficient earliness to be profitable as a market crop in those sections where the seasons are short, was detailed in our last annual report.† Selections and further crosses were made the past season with interesting and promising results.

The *Lorillard-Peach* cross showed a less marked increase over the pure Lorillard in number of fruits, than was the case in the first generation. In the second generation, the influence of the male parent on the character of the fruit was shown by several individuals which assumed the form and the rough skin of *Peach*. The *Ignotum-Peach* cross showed a similar falling off in the second generation,—the difference amounting to nearly 44 per cent.

5. *Varieties*:—The tomatoes were started in the forcing house March 27. All varieties were given the same treatment while in the house, and were transferred to the open field June 1st. The first ripe fruits were found July 25, on Golden Ball and Long Keeper. Two days later one or more fruits were gathered from Aristocrat, Great B. B., Ithaca and Maule's Earliest.

On October 1st, when the season was practically ended, the following varieties were found, in the order named, to have been the most productive: Golden Ball, Improved Peach, Maule's Earliest, Burpee's Climax, Lorillard, Ithaca and Belmont. Optimus, which was the most productive sort grown last year, stood *ninth* (or dropping the first two varieties, which are of value for amateur culture only, *seventh*) in the list the present season.

The large late varieties, such as Belmont, Buckeye State and Stone, decayed very badly late in the season. The same is true to a certain extent of Ignotum, Matchless and Optimus.

Maule's Earliest and Burpee's Climax were both much smoother than is usual with very early sorts and are promising.

Ithaca and Long Keeper deserve the credit given in previous reports.

Lemon Blush failed to blush and was consequently inferior to Golden Queen.

Buckeye State, Royal Red and Stone, while of merit as individual fruits, are all too late for our short seasons. Ponderosa will also be discarded for similar reasons.

Terra Cotta was of very unsatisfactory quality and is not a firmly fixed variety.

Great B. B., in spite of its name, is a fairly good variety. It decayed badly late in the season.

Summary of Tomato Notes, 1893.

1. The conclusions of former years as to the value of setting tomato plants as early in the spring as possible are confirmed.

2. Plants handled in pots previous to setting in the field are more vigorous and productive than those not so handled,—a fact which may be of great importance to the commercial grower.

3. Individual variation is often such as to render the work of any one season unreliable.

4. The productiveness of any given variety may be largely increased by crossing with some of the smaller less valuable sorts. But this increased productiveness may be partially or wholy lost in a few years even if good culture is given. The variety will quickly "run out."

5. It seems possible that seeds from plants grown under high culture in the house, may give better results than those from plants not so treated.

6. By combining the *Lorillard-Currant* hybrid with the Lorillard, the size has been fully doubled and the quality much improved; but there has been a reduction in the number of fruits produced.

7. Of the newer varieties, Burpee's Climax, Maule's Earliest and "B. B." (Brinton's Best) were among the most promising. Buckeye State, Ponderosa, Royal Red and Stone are too late for our climate. Lemon Blush lacked its distinguishing characteristic, and Terra Cotta was of inferior quality.

W. M. MUNSON.

MAINE STATE COLLEGE,
ORONO, ME., March 15, 1894.

BULLETIN No. 10.

CAULIFLOWERS.

The cauliflower is a vegetable highly prized by many, but is too seldom met with in the home gardens of our State. Possessing many of the good qualities of the cabbage, it is to a certain extent lacking in the peculiar rank flavor which renders the former disagreeable to many people. The delicate qualities of the cauliflower are, however, frequently disguised or lost through failure of the housewife to familiarize herself with the best methods of serving. For this reason we send with this bulletin directions for cooking the cauliflower, condensed from material kindly furnished by Miss Anna Barrows, School of Domestic Science, Boston.*

1. *Culture:*—In a general way the culture is the same as for cabbages. Early varieties should be started in the house or hot bed as soon as the first of April. Handle as needed and set in the open field as early as possible—say the 20th of May, setting the plants about two by three feet.

The best soil is a rich, moist, but well drained loam. Like the cabbage, the cauliflower is a gross feeder and demands intense culture. If growth is stopped, from any cause, the heads are

* *Directions for Cooking the Cauliflower.*—A cabbage or cauliflower, unless taken directly from the garden, is much improved if so placed that it can absorb water through its stalk for 12 to 24 hours before cooking. Soak a cauliflower, head down, in cold salted water for an hour before cooking, to draw out any insects that may be concealed. A small cauliflower may be cooked whole and should be placed in the kettle with the flowerets up, as the stalk needs most thorough cooking. A large head should be divided into six or eight sections. Cook in a kettle of rapidly boiling salted water to which may be added one-fourth of a level teaspoonful of soda, (the soda aids in softening the woody fibre). The kettle should be skimmed occasionally while the vegetable is cooking; or, to save trouble, some prefer tying the cauliflower in a thin cloth. An agate or porcelain lined kettle is preferable to iron, which is likely to discolor the cauliflower. The odor is less noticeable if the kettle is left uncovered; the water may also be changed to dispel the odor. A cauliflower should be tender after twenty to thirty minutes of rapid boiling. If overcooked it appears soggy and water-logged.

A good cauliflower, well cooked, requires little additional flavor besides salt and good butter. Some, however, prefer the addition of grated cheese. The cauliflower may also be served as a garnish for meats, in sauces, soups and is excellent cold as a salad. Many prefer it with a thick cream sauce.

"Cold boiled cauliflower is very good fried plain in butter or breaded and fried, or mashed and fried like oyster plant, with the addition of an egg and a palatable seasoning of salt and pepper."

The last paragraph is from Miss Corson's Practical American Cookery. Many other hints may be obtained from this and other leading guides to cookery.

liable to "button," or form small sections interspersed with leaves, worthless for market purposes.

Frequent cultivation is necessary and it is probable that in case of very dry weather about the time of heading, irrigation would be a profitable means of securing a crop, at least for home use. When the heads are about three inches across, the outer leaves should be brought together and held in place by means of a piece of twine or raffia, that the heads may be well bleached.

2. *Influence of Early Treatment of Plants.*—The question as to the value of handling the plants in pots previous to setting in the open field, was considered with reference to the number of heads produced. Four varieties were used in the test with the following results:

In two instances there was a difference of twenty per cent. in favor of the plants grown in pots. One variety gave the same number of heads in each case, but the plants from pots were two or three weeks earlier than the others. The fourth variety gave a slight difference—about seven per cent.—in favor of the box treatment. Doubtless any benefit that might arise from handling plants in pots would lie in the more uniform rate of growth secured.

Conclusion.—Indications point to an increased percentage of marketable heads as a result of handling cauliflower plants in pots during the early stages of growth.

3. *Effects of Trimming.*—The practice of reducing the amount of foliage at the time of removal to the field received attention the past season. The foliage of one lot of each of five varieties was reduced by one-half, while duplicate lots were left without trimming.

As a rule, the per cent. of heads formed was greater from plants not trimmed. There was practically no difference in the earliness of the two lots, nor was there a marked difference in the size of the heads.

Conclusion.—Results obtained will not warrant us in commending the practice of trimming cauliflower plants severely at time of setting in the field.

4. *Varieties.*—Nearly all of the more important varieties of cauliflower were grown in our gardens the past season for purposes of comparison. As was expected, great variation was found in the different varieties and strains of the same type, as regards

earliness, percentage of heads formed, and the character and quality of the heads.

Nearly all of the earliest varieties produced a high percentage of marketable heads, while the late sorts were anything but satisfactory. Of the whole number of varieties grown, sixteen produced more than seventy-five per cent of marketable heads, while with eight varieties every plant produced a good head. Most of the late varieties were checked by the dry weather and showed a tendency to "button," or go to seed.

The following field notes concerning some of the more important varieties were made:

Alabaster (Johnson & Stokes).—Said to be a sport from *Dwarf Erfurt* (see below). A small, early variety, of erect habit, thus permitting of very close planting.

Autumn Giant (Thorburn).—A very large, late variety of excellent quality. Should not be started so early as most other sorts

Best Early (*Burpee's Best Early*, Burpee)—Small, but one of the earliest and surest heading varieties.

Dwarf Erfurt (Thorburn).—Takes its name from the city of Erfurt, Germany, where cauliflowers are extensively grown. One of the most popular early varieties Several strains were grown the past season, of which the best seemed to be Thorburn's Extra Early.

Early Danish (Farquhar).—Of the Erfurt type; forming a medium sized head, very firm and good. One of the best.

Early Paris (Thorburn, Farquhar).—Moderately vigorous, with long stem and of spreading habit. Leaves covered with heavy bluish white bloom, giving the variety a characteristic light shade. Heads of fair size but lacking in solidity.

Giant Purple (Childs).—A large late variety; very attractive when growing and of excellent flavor, but when served its color is objectionable.

Imperial (Landreth).—A medium sized, pure white variety; of spreading habit, heads not sufficiently firm.

Kronk's Perfection (Farquhar).—A very fine strain of the Erfurt type. Of medium size, early, uniform, and in our plantation was among the best.

Landreth First (Landreth).—Of vigorous, erect habit, but having a short stem. Heads of medium size, white, and rather remarkable for uniformity. One of the best.

Livingston's Earliest (Livingston).—One of the earliest. Small but uniform in date of maturity—a valuable consideration in a market variety.

Long Island Beauty (Gregory). A valuable second early sort. Only two cuttings were necessary, and every plant produced a marketable head.

Prize Earliest (Maule).—Three weeks later than some of the other early sorts. Not satisfactory this season.

Snowball (*Early Snowball*, Thorburn).—A moderately vigorous variety forming small but very solid heads. From this type many valuable strains have been derived. One of the most valuable of these is the next mentioned.

Thorburn Gilt Edge (Thorburn).—Not quite so vigorous as the parent, the leaves being slightly smaller and very dense, while the stem is shorter Heads small but of good form and solid. Usually one of the most reliable.

Vaughan's Danish Snowball (Vaughan).—Differs little from *Snowball* mentioned above. Very early and apparently a sure header.

Algiers, Italian Taranto, Late Dutch, London, Nonpareil, Stadtholder and some others, while producing very good individual heads, were not reliable the past season, but will be given further trial.

SUMMARY.

1. The general treatment of the cauliflower is similar to that required by cabbages. Thorough and frequent cultivation are essential. The outer leaves should be brought together and tied a few days before cutting, that the heads may be well bleached.

2. Handling plants in pots before setting in the field increased the percentage of marketable heads.

3. Trimming plants at time of setting is of doubtful value.

4. Early varieties are, as a rule, more certain to produce a satisfactory crop than are the later sorts.

5. The earliest varieties grown the past season were: Burpee's Best Early, Dwarf Danish, Kronk's Perfection and Livingston's Earliest; closely followed by Alabaster, Landreth's First, Long Island Beauty and several strains of Snowball. All of these varieties produced a high percentage of marketable heads.

W. M. MUNSON.

MAINE STATE COLLEGE,
Orono, Me., April 1, 1894.

BULLETIN No. 11.

CORN AS A SILAGE CROP.

The report of the Station for 1891, pp. 41-46, gives a summary of three years' work in testing the relative production of food material by various fodder and root crops. It appeared that the large variety of corn known as Southern White produced the greatest amount of digestible dry substance per acre, excelling root crops, Hungarian Grass and other varieties of corn. Since 1891 a comparison between varieties of corn has been continued. This has been done because the corn crop is an important one to Maine dairymen and because the problems connected with its growth in Maine are local in their nature and cannot be solved by experiments in other states, excepting possibly New Hampshire and Vermont.

The most common question asked in this connection is, Which are the most profitable varieties to grow, the large, which mature only in a latitude south of New England, or the smaller, which complete their growth in this climate?

As set forth in the report previously mentioned, the proper test of productiveness is the yield of digestible dry matter, the gross weight of crop or even of total dry matter being deceptive because of differences in the water content and in digestibility. All effort has been directed, then, towards ascertaining the actual growth of digestible material in the several cases. One other point has necessarily been considered, viz.: The relative value of a pound of digestible material in the crops compared. This latter comparison can most safely be made by feeding experiments, and this has been the method used.

The study of the corn crop has been conducted in 1892 and 1893 in much the same manner as in previous years, only somewhat more comprehensively. The results secured are concisely stated in the accompanying table, all intermediate data, such as size of plots and yield per plot, being omitted. The figures for the three years previous are stated for the sake of comparison.

COMPARATIVE YIELD OF SOUTHERN CORN AND MAINE FIELD CORN, AS GROWN IN MAINE.

	Yield Per Acre.				
	Green corn (whole plant.)	Dry substance.		Digestible dry substance.	
	lbs.	%	lbs.	%	lbs.
Crop of 1888.					
Southern corn	26,295	12.30	3,234.3	65.	2,102.3
Maine field corn	14,212	17.4	2,472.9	70.	1,720.5
Crop of 1890.					
Southern corn	32,950	14.94	4,922.7	69.	3,396.7
Maine field corn	15,300	15.84	2,415.9	71.	1,715.3
Crop of 1891.					
Southern corn	46,340	13.46	6,237.4	61.	3,804.8
Maine field corn	28,080	13.55	3,804.8	73.	2,777.5
Crop of 1892.					
Southern corn, Field 1	37,320	14.67	5,474.8	64.	3,503.9
Southern corn, Field 2	34,820	14.15	4,927.	64.	3,153.2
Maine field corn, Field 1	22,490	20.90	4,700.	78.	3,666.
Maine field corn, Field 2	29,400	18.64	5,480.	76.	4,164.8
Crop of 1893.					
Southern corn, Field 1	39,066	15.45	6,035.7	65.*	3,923.2
Southern corn, Field 2	26,660	16.58	4,420.2	65.*	2,873.1
Maine field corn, Field 1	27,780	25.43	7,064.4	70.	4,945.
Maine field corn, Field 2	18,610	19.50	3,328.9	70.	2,540.2
Southern corn, 7 trials					
Maximum	46,340	16.58	6,237.4	69.	3,923.2
Minimum	26,295	12.30	3,234.3	61.	2,102.3
Average	34,761	14.50	5,036.	65.	3,251.
Maine field corn, 7 trials					
Maximum	29,400	25.43	7,064.4	78.	4,945.
Minimum	14,212	13.55	2,415.2	70.	1,715.3
Average	22,269	18.75	4,224.	73.	3,076.

* The average of previous years.

The foregoing figures show a large variation in production in different years, under conditions other than the season, quite uniform. This variation is not alone in gross weight of crop, but in dry matter as well. The largest quantity of dry matter produced in any case during the five years is nearly three times that yielded by the smallest crop. This is in part due to manuring and cultivation and in part to the character of the season.

Had these experiments been discontinued after 1891 the outcome would have been decidedly favorable to the large variety of Dent corn, but in 1892 and 1893 the relation of yield has been reversed and the smaller variety of Flint corn has taken the lead. It is probable that another five years' series of comparisons would furnish a somewhat similar experience.

The general outcome for the five years is slightly favorable to the large variety of corn if we consider only the yield of digestible dry matter. But when we take account of the fact that in the one case an average of five and one-half tons more of material have annually been handled over several times, we are led to conclude that the smaller, less watery variety of corn has really proved the more profitable. It is significant, also, that the largest yield of dry matter in any instance has been from the small variety. While the Flint corn grown in this State is not capable of storing so much dry substance as the large varieties of Dent corn, under circumstances equally favorable for both, the latter cannot in this latitude reach anything like maturity, and so loses the advantage of that period when growth is most rapid.

SUMMARY.

(1). The average weight per acre of the green crops for five years were: Southern Corn, 34,761 lbs.; Maine Field Corn, 22,269 lbs.; difference, 11,492 lbs., or nearly five and three-fourths tons.

(2). The average dry matter per hundred pounds was nearly one-third more in the Maine Field Corn, the relation being Southern Corn, 14.50 lbs.; Maine Field Corn, 18.75 lbs., or as 100 : 129.

(3). The Maine Field Corn proved to be the more digestible, the relation for dry matter being: Southern Corn, 65 per cent; Maine Corn, 73 per cent., or as 100 : 112.

(4). The average pounds of digestible dry matter per hundred pounds of green corn have been: Southern Corn, 7.25 lbs.; Maine Field Corn, 13.69 lbs., or as 100 : 189.

(5). The average yield of dry matter per acre has been: Southern Corn, 5,036 lbs.; Maine Field Corn, 4,224 lbs.

(6). The average yield of *digestible* dry matter has been: Southern Corn, 3,251 lbs.; Maine Field Corn, 3,076.

(7). The yield of digestible dry matter has averaged 175 lbs. more with the Southern Corn. To offset this it has been necessary to handle annually five and three-fourths tons more weight.

(8). The largest as well as the smallest yield of digestible matter in a single year has come from the Maine Field Corn.

W. H. JORDAN.

MAINE STATE COLLEGE,
ORONO, ME., April 2, 1894.

BULLETIN No. 12.

POTATOES.

A COMPARISON OF THE TRENCH SYSTEM WITH ORDINARY CULTURE.

A few years ago considerable interest was aroused by the accounts of wonderful yields of potatoes obtained by a method of culture known as the Rural New Yorker trench system. The system derives its name from the fact that it was first used at the trial grounds of the Rural New Yorker and was advocated by the editor of that paper, Mr. E. S. Carman.

The system consists essentially in planting the tubers in trenches five to seven inches deep and twelve to fifteen inches wide, the bottoms of which are well pulverized; covering to the depth of about two inches; then applying any desired amount of fertilizer in the trench, after which the trenches are filled so that the surface shall be level.

Now it has been the practice of the writer for several years to plant in furrows, applying fertilizer broadcast over the surface of the ground; for there is little doubt that the old custom of "hilling" potatoes is worse than useless,—it is positively injurious to the crop on dry soil. It has seemed doubtful in view of the fact that the roots of the potato extend in all directions, filling the whole space between the rows, whether placing the fertilizer in a trench only could be as rational or in practice as satisfactory as the other method.

In the paper referred to and also in a book recently published,* the statement is made that "In every trial the land laid out in trenches, whether with or without fertilizer or manure, has largely outyielded that planted according to the old method of hills or furrows."

In an issue of the Rural New Yorker of recent date is a detailed account of a comparison of the two methods as conducted on the grounds of the originator of the trench system. From this trial the following conclusions were drawn: "There is a difference of the total yield per acre of only one-half bushel (.49) in favor of the trenches but of the marketable potatoes there is a difference of over seventeen bushels per acre in favor of the trenches.

* The New Potato Culture, p. 35.

"The yield of small potatoes (unmarketable) of the furrows is 16.79 bushels per acre greater than that of the trenches."*

The work of this station, planned without the knowledge that similar work was being undertaken elsewhere, is detailed below.

On a piece of sandy loam, having a southern aspect, alternate rows of the variety named below were planted three and one-half feet apart—one being "trenched," the other planted in an ordinary furrow. The rows trenched were plowed about a foot wide and eight inches deep, after which the soil in the bottom of the furrow was loosened and pulverized, some of the earth being worked back into the furrow. The "seed," cut to two eyes, was then planted one foot apart in the row. The pieces were covered to a depth of about two inches, when a complete fertilizer at the rate of one thousand pounds per acre was scattered in the trenches, and the trenches were filled.

The other rows were simply plowed, the seed pieces dropped and covered, when the same amount of fertilizer as before was scattered on the surface. As soon as the young shoots appeared above the surface a smoothing harrow was used and thorough culture was given until about the middle of July, when the vines covered the ground sufficiently to keep the weeds down and serve as a mulch for themselves.

The comparative results are shown in the accompanying table:

TRENCH SYSTEM VS. ORDINARY CULTURE OF POTATOES.

VARIETY AND SYSTEM.	Weight of product—pounds.	Weight of marketable tubers—pounds.	Weight of small tubers—pounds.	Average number of marketable tubers per hill.	Yield per acre of marketable tubers—bushels.	Yield per acre of small tubers—bushels.
EARLY ROSE.						
No. 1. Furrow	58.87	51.03	7.84	5.6	234.4	34.6
Trench	61.48	53.24	8.24	5.0	244.8	37.9
No. 2. Furrow	80.00	71.00	9.00	6.9	327.7	41.5
Trench	79.23	68.72	10.51	6.1	317.4	48.5
CRANE'S JUNE.						
No. 1. Furrow	69.90	62.00	7.90	6.0	286.2	36.3
Trench	66.30	54.81	11.49	5.2	253.1	52.9
No. 2. Furrow	70.19	58.45	11.74	5.9	269.6	54.1
Trench	71.57	61.04	10.53	5.8	282.1	48.5
HEBRON.						
Furrow	64.15	59.12	5.03	5.4	271.7	23.2
Trench	74.07	65.16	8.91	5.4	300.8	41.1

*Rural New Yorker, Oct. 14, '93, p. 683.

In every instance duplicate lots produced contradictory results. The first lot of Early Rose gave a greater yield from the trench—the difference being nearly ten bushels of marketable tubers per acre. The second lot reverses these figures, so far as the marketable tubers are concerned, but the increased number of small potatoes makes the total yield practically the same with the two methods of treatment.

The first of Crane's June gave a difference of thirty-three bushels of marketable tubers per acre, in favor of the furrow; while in the second lot the trench produced at the rate of twelve bushels per acre more than the other.

In each instance above mentioned the number of marketable tubers per hill was slightly smaller in the trenches and the weight of individual tubers was somewhat greater. On the other hand, with one exception, the small tubers from the trenches exceeded in weight and number those from the furrow.

Hebron, from the trench was superior to the same variety from the furrow. The number of tubers per hill was the same but the individual tubers from the trench were so much superior as to be equivalent to an excess of twenty-nine bushels per acre over the other.

It will be seen that these facts are, in a measure, opposed to conclusions concerning the system which have heretofore been published. We would not, however, condemn the method without further trial; though it is but just to say that certain parties quoted as obtaining specially marked results from the trench system have discarded this method in general practice.

Conclusion:—It is questionable whether the results obtained will justify the extra labor involved in practicing the trench system of potato culture. In our trials the past season duplicate lots in every instance produced contradictory results.

W. M. MUNSON.

MAINE STATE COLLEGE,
Orono, Me., May 1, 1894.

BULLETIN No. 13.

THE SUPPRESSION OF BOVINE TUBERCULOSIS AND GLANDERS.

The object in writing this bulletin is to call attention to the modern, and, in most cases the only, methods of determining whether animals are suffering from these diseases. But little reference is made to the general symptoms of the diseases, for although volumes might and have been written describing the symp'oms that are sometimes noticed, it is a well known fact that in many cases, particularly in tuberculosis, there are no symptoms that would either attract the attention of the owner or that can be detected by the most skillful veterinarian, and in this obscurity lies the chief danger. A long description of inconstant symptoms will tend to obscure the points presented here and would accomplish nothing. Any inquiries regarding diseased animals, accompanied by a description of the symptoms, the Experiment Station will be ready to answer at any time.

Tuberculosis of cattle is a widely distributed disease differing in no very essential particular from tuberculosis of other animals. It is transmitted from sick to well cattle through the matter coughed out and through the milk, and very rarely directly from parent to offspring by inheritance. On account of the conditions under which they are kept, dairy cattle are most subject to the disease and in general it is most prevalent among cattle where consumption and other forms of human tuberculosis most prevail. On the other hand, it seems to be true that human tuberculosis is most prevalent where the meat and milk of tuberculous cattle are used for human food. The statement is made that among some reservation Indians where diseased meat is freely eaten, the death rate from tuberculosis is one-half of all the deaths.

There are two principal reasons why every effort should be made to suppress bovine tuberculosis. 1st: It should be done to protect healthy cattle that are continually being exposed; and 2d: It should be done to save the many thousands of human lives that are yearly sacrificed to consumption contracted and fostered by milk, meat, etc., from tuberculous cattle. It is certainly true that either of these reasons offers grounds sufficient to warrant the adoption of even what may seem to some to be extreme measures to suppress this terrible scourge. If it could be shown that as a state we were entirely free from obvine tuberculosis and sufficient means were being used to preserve that freedom, it would create such a demand for our dairy stock as would compensate us for all the expense involved and we would not be subject in any such measure to the continual losses that we now have to meet from this cause. If any of our breeders have an ambition to improve their stock and go out to purchase animals to this end, they stand about an even chance of ruining their herd and business by introducing tuberculosis with the improved blood. Many instances of this sort might be mentioned as having occurred in this State, and it is safe to say many more will occur unless measures are taken to prevent it. Many of our most progressive dairymen and stock breeders have run against this snag in their business, and have either been obliged to dispose of their stock at a loss to themselves or to those who purchased it, or to continue breeding from diseased stock—a course which deserves to be condemned from every standpoint of policy and safety.

One tuberculous cow introduced into a large dairy herd has often been the means of contaminating most of the herd, and one diseased herd of choice animals where the calves are raised and sold has often been the means of introducing tuberculosis into many herds, to the material loss of the owners. A much more serious reason than the purely financial one why every effort should be made to suppress bovine tuberculosis is the close relation it bears to the same disease in human beings.

Every tuberculous cow is a menace not only to the health of other cattle, but to the lives of human beings. Bovine tuberculosis is not perhaps the greatest factor in causing human tuberculosis, but it is an important factor. It is possible to demonstrate beyond a reasonable doubt that thousands of children and adults die each year as a direct result of bovine tuberculosis. Tuberculosis of cattle and human beings is the same disease, due to the same cause, bacillus tuberculosis. This bacillus thrown off from the lungs of consumptives, coughed out by tuberculous cattle, in the milk of consumptive mothers, or in the milk or flesh of diseased cattle, has the same power to set up disease in susceptible animals without regard to its source. When we consider that during the one year of 1892 in this State alone, 1,513* human beings died from pulmonary and other forms of tuberculosis and that 1892 was probably not an exceptional year in this regard, we ought to awake to the importance of removing the cause of this great fatality as far as possible. This was the year in which grip raged to such an unusual and alarming extent, yet the grip caused less than half (755)* this number of deaths and all other forms of contagious diseases combined did not prove so fatal as tuberculosis.

If the much dreaded disease, small pox or Asiatic cholera, should gain a foothold in our State and for one year cause half the havoc that tuberculosis does every year, the State and nation would combine to use every available means to check it, and they would succeed. Now tuberculosis is a more surely fatal disease than either of these, but just as surely preventable, and, if through long and continuous familiarity with it we had not come to regard its ravages as almost inevitable, we might be comparatively free of it within five years. Dr. Law says "Tuberculosis is allowed to continue its career of death only because of reprehensible ignorance and criminal indifference." (Cornell University, Agricultural Experiment Station, Bulletin No. 65.)

The greatest obstacle to the suppression of bovine tuberculosis next to "criminal indifference" has been the difficulty in determining what animals were affected and what were healthy. We have had no means by which we could detect the early stages of the disease. If a cow were well fed and cared for she might for years be a source of contagion in a herd and a menace to the health of human beings, without her true condition being known. This difficulty in detecting the disease made it practically impossible to get rid of it. The most that could be done was to kill off the advanced cases as soon as they could be detected. Now, however, this is changed. We have a method by which it is possible to detect tuberculosis in cattle in any of its stages with a very high degree of certainty. If there are any cases that cannot be detected by this means, they are either so advanced that the merest novice will have no difficulty in diagnosing them by a physical examination, or, the animals are very slightly affected, the disease for the time being making no progress, so that for practical purposes they can hardly be considered diseased.

In this brief bulletin it is impossible to describe in detail the method by which the diagnosis of tuberculosis in cattle is made easy and certain. It is perhaps sufficient to say that by the simple

*Report of State Board of Health for 1893.

injection of a twentieth of a gram of tuberculin underneath the skin of a cow there will be a marked rise of temperature within from nine to fifteen hours, provided she has tuberculosis, and not otherwise. Tuberculin, the diagnostic agent, is a chemical substance, that in the dose given has not the slightest injurious effect upon well animals. There are certain precautions to be taken to avoid mistakes, and some degree of skill and familiarity with the diseased conditions of cattle is necessary on the part of one making the test, but with suitable instruments and professional skill it is comparatively easy for one man to examine a herd of fifty animals in less than twenty-four hours and detect every case of tuberculosis that may exist there. Thus we see that the problem of suppressing bovine tuberculosis, we will not say the complete extermination, for this will be impossible while other tuberculous subjects are allowed to freely distribute the seeds of disease, resolves itself into the simple testing of all bovines with tuberculin; and as soon as the public mind is awakened to the true importance of the work this will be done, and the tests will be repeated sufficiently often to keep the disease in check. Public sentiment that will demand the suppression of what has long been regarded as an inevitable evil may be slowly developed, but its development is sure when the work to be accomplished is so simple and important as the suppression of tuberculosis.

But if radical and generally applicable measures are not at once in operation to do away with this disease, there is no reason why individuals should not protect their own herds and the lives of their families and patrons by making sure that they are not harboring it. A man who will buy and keep a family cow to supply milk and butter for his children and not adopt the simple and inexpensive measures necessary to be sure she is not affected with tuberculosis is either ignorant of the danger incurred or guilty of negligence little short of criminal. The dairy man who is supplying the public, including invalids and children, who are particularly susceptible to consumption, with milk or butter, who will not go to the slight expense necessary to test his herd for tuberculosis, has neither a proper regard for his own or patrons' interest; and, particularly, the breeder of choice dairy stock that will continue to breed and distribute among other herds cattle that may, and, as experience has shown, are particularly liable to carry with them the seeds of tuberculosis, is not deserving of public confidence. Any one can purchase tuberculin from some of the leading druggists and also the necessary instruments with which to administer it, but we would advise the average farmer and stock owner not to undertake a test of this importance, the complete success of which depends upon experience and professional skill. It would be better to employ a competent veterinary surgeon. The expense ought not to be very great. For the present, as far as other work will permit, the Experiment Station will undertake to examine cattle for tuberculosis in any part of the State where the owner will pay travelling expenses. We cannot promise to continue to do this indefinitely, but for the next few months, for the purpose of obtaining data relative to the prevalence of tuberculosis among our cattle, we hope to be able to answer all calls in this direction. It is possible that arrangements can be made to examine a limited number of large herds free of all expense to the owner. After a herd is once free from tuberculosis, we can only be sure of keeping it free by attention to the following details:

1st. Have the barn thoroughly disinfected. 2nd. Retest the herd at intervals. 3rd. Test all purchased animals before adding them to the herd.

GLANDERS.

This is a disease prevailing among horses and mules, and transmitted from them to some other domestic animals and to man. Cattle are not subject to it. In a very general way it bears some resemblance to tuberculosis. Its presence has often been difficult and even impossible to determine. Horses are sometimes affected with it for years, and carry the disease to other horses without manifesting any symptoms that lay them open to suspicion. The disease is conveyed to man and other animals brought into contact with the diseased one chiefly through the nasal discharges and from ulcerating lymphatic glands. Recoveries from glanders are probably less frequent than from tuberculosis, and when transmitted to human beings it usually assumes an acute and speedily fatal form. The glanders bacillus is the active source of this disease and this bacillus is given off from diseased animals, chiefly in the nasal discharge and in the discharge from the ulcerated lympathic glands Well animals contract the disease by introducing into their systems in some way the glanders bacilli contained in these discharges. The disease is most prevalent where large numbers of horses and mules are found closely associated in confinement. Here the conditions are most favorable for the spread of the disease, but as horses circulate quite freely from city to country districts, public watering troughs and feed stables where transient boarders are kept also have their share in spreading the disease. Through this State cases are continually appearing in such advanced condition that they cannot be mistaken for anything else and they are killed. How many other affected animals escape detection and are not even suspected of being glandered, nobody can tell, but it must be a considerable number. In any suspected case or in the case of any animal where it is desired to know positively whether the horse is suffering from glanders we now have a sure test similar in nature to that by which we determine the presence of tuberculosis. A very small quantity of a chemical substance called mallein injected into a glandered horse causes a rise of temperature and a local swelling at the point of the injection, while if the horse is sound the small dose of the mallein used apparently has no effect. The discovery of the value of mallein in diagnosing glanders followed soon after the discovery of tuberculin, and while of less importance, is nevertheless of great value. In stables where one horse among many is found to have glanders we can with mallein make sure that no obscure cases are allowed to remain. By this test prized family horses suspected of having glanders can often be shown to be free of it, and none of the wiles of the tricky dealer will be able to disguise glanders so that this test well made will not reveal it.

SUMMARY.

1. This bulletin is for the purpose of calling attention to a satisfactory method of determining the presence of tuberculosis in cattle and glanders in horses.

2. Tuberculosis is a widely distributed disease common to man and other animals and readily transmitted from one to the other.

3. Tuberculosis is spread among cattle and from cattle to man by the material coughed out from the lungs and by the milk and flesh of affected cattle.

4. Bovine tuberculosis should be suppressed as a measure of economy and to prevent sacrifice of human lives.

5. By a physical examination tuberculosis in cattle can only be detected in advanced stages.

6. By means of tuberculin it can be readily detected in all stages.

7. The tuberculin test is simple, harmless and conclusive and should be used to test all cattle in the State and all imported animals before they are introduced into new herds.

8. The Experiment Station will for a time undertake to test cattle for any who may desire, at the simple cost of traveling expenses.

9. Glanders is often an obscure disease with no well marked symptoms.

10. Glanders may be transmitted from affected horses and mules to man by means of the discharge from the nostrils or from ulcerated lymphatic glands.

11. Glanders is most prevalent in large cities but is often conveyed by the sale of affected horses into country towns.

12. Mallein serves as a sure test of the presence of glanders.

13. Mallein can be used with no risk and slight expense.

F. L. RUSSELL.

MAINE STATE COLLEGE,
Orono, Me., June 1, 1894

BULLETIN No. 15.

A SCHEME FOR PAYING FOR CREAM BY THE BABCOCK TEST IN BUTTER FACTORIES.

J. M. BARTLETT.

Several of the butter factories in this State are already employing this test to determine the butter value of the cream furnished by their patrons and are making use of those values as a basis of payment. In some cases considerable confusion and dissatisfaction have arisen between the patrons and managers of the factories, due in some cases to a misunderstanding on the part of the former and in some few instances to an improper handling of the test on the part of the latter. We feel it our duty to state here that no person should even attempt to employ the test as a basis of payment until he has thoroughly mastered it and has convinced himself that he can obtain correct results. It would be better in all cases if he could secure instruction from some person competent to give it, than to try to work it out by himself.

Another and the principal cause of confusion and misunderstanding has been the many systems employed by the different factories for applying the test in a practical way, and as it is evident that this will soon be the universal method of paying for cream and milk it seems absolutely essential that some good and uniform system should be adopted.

The object of this bulletin therefore, is to present what we consider the best system for this important work and which is, practically, the one in general use in milk gathering creameries. In this system the cream is to be bought by weight as we believe it simpler, more accurate and just as rapid to weigh with one of the spring scales which can be found in most hardware stores, than to measure by any system now in use.

APPARATUS FOR SAMPLING AND WEIGHING.

Pail for Weighing.—For this purpose we would suggest a light pail not more than nine or ten inches in diameter and eighteen to twenty inches deep, having a strong bail, a lip or nose on the top and handle near the bottom to assist in emptying. It should be made of light material and strengthened at the top by a hoop to avoid denting when being emptied and should weigh five pounds.

This will hold easily fifty pounds of cream, which is as much as the collector cares to handle.

Scale for Weighing.—There are several spring scales on the market that doubtless are good for this purpose, but the best we have seen is a Chatillon spring scale that has a dial and will weigh up to sixty pounds.

The indicator can be set back so it will stand at zero when the pail is attached. The figures to which it points after the cream is put in will be the weight of the cream.

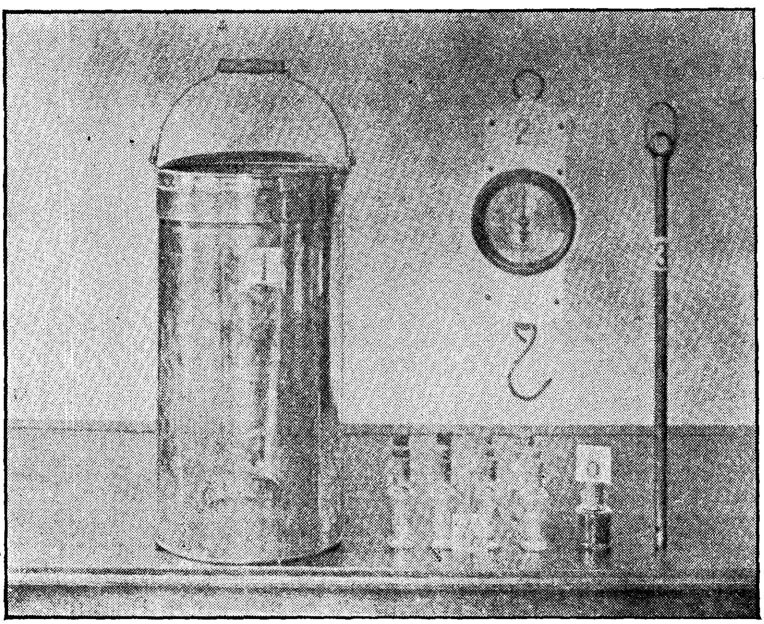
This scale is compact and can be carried in a box eight by fifteen inches. In making the weighing, it can be hung on a support on the back of the collector's wagon or on a hook in the dairy that is high enough to allow the pail to hang clear.

Tube for Taking the Sample.—For this purpose we would recom mend a metal tube about two feet long and five-sixteenths inch inside diameter, provided with a stopper at the lower opening that can be worked at the top by a small rod running down through the large tube.

Bottle for Carrying the Sample.—We prefer a two-ounce, wide mouthed bottle, made of strong glass and provided with a cork stopper. A case should be provided for these bottle with pockets to prevent them from rattling around, and a closely fitting cover to protect them from cold weather in winter. Each bottle should be given the number of the patron for whom it is to be used.

SAMPLING FOR THE TEST.

Manipulation.—After the cream has been turned into the weighing pail, the sample is taken by letting the sampling tube, with the lower end open, *slowly* down to the bottom of the pail. The lower opening is then closed, the tube taken out, allowed to drain a moment and the contents run into the bottle marked with the patron's number. It is very essential that this tube be let down slowly and that the lower end be open, so it will fill as it goes down, taking a section of the cream through the whole column and insuring a correct sample. If the tube is let down quickly, or with the lower end closed, and then allowed to fill from



COLLECTOR'S OUTFIT.
1. Pail for weighing. 2. Scale. 3. Sampling tube. 4. Sample bottles.
5. Preservative (bichromate of potash).

the bottom of the pail, it is possible to get a sample much less rich in fat than the top would yield. If there is more than one pail of cream, a portion should be taken from each and every lot weighed out. If a tube full from every lot more than fills the sample bottle, then all the portions drawn should be mixed in a dish large enough to hold them and the bottle filled from the mixture. In any case enough should be taken to fill the sample bottle to prevent churning on the road.

Preservative.—For this purpose we would recommend bichromate of potash. After the sampling bottles are thoroughly cleaned with hot water and washing soda, a small amount, about what can be held on one-quarter inch of the blade of a penknife, of the finely powdered bichromate of potash should be put in each bottle before starting out to collect cream, then if the cream is perfectly sweet and well shaken up after being put in the bottle, it will keep sweet two weeks if kept in a cool place. Cream that is sour should not be sampled, as it is impossible for a collector to get a fair sample of it in any reasonable length of time. If it has become thick it cannot be mixed by the collector so it will be uniform, and cannot be sampled with the tube. Creamery managers should insist that their patrons keep their cream sweet until it is taken by the collector. This is essential not only to correct sampling, but to making a good quality of butter.

Composite Sample.—The composite sample is made up from the small samples taken by the collector and is the one from which the portion is taken for the test. Half-pint fruit jars are good receptacles in which to put these samples, and each one should be numbered with the patron's number, the same as the small bottles used by the collector.

The small samples are taken every time cream is collected according to the directions previously given, and as soon as they arrive at the factory they are emptied into the fruit jars having corresponding numbers. The jar should be closed tightly to prevent evaporation. At the end of two weeks, if one chooses to test as often as that, these accumulated small samples constitute the composite sample and the per cent of butter fat found in this sample will be the average per cent in all the cream furnished by the patron having that number for that period.

In winter, or if the composite sample be kept in an ice chest with the preservative, it could be kept four weeks as easily as two, thereby reducing the work of testing one-half.

Paying for the Cream.—The majority of our creameries in this State are co-operative and therefore the profits are divided among the patrons in proportion to the amount of butter fat furnished. With this class of creameries the simplest method of dividing profits is as follows, and is best presented by an illustration:

Suppose we have a creamery with A, B and C as patrons.

A furnishes for one month	400	lbs. cream testing	20%	butter fat.
B " " " "	500	" " "	18%	" "
C " " " "	600	" " "	15%	" "

Then A furnishes $400 \times .20 = 80$ lbs. butter fat.
" B " $500 \times .18 = 90$ " " "
" C " $600 \times .15 = 90$ " " "
Total received, 260 " " "

The net profits from the sale of butter and cream for the month are $70.

Then A is entitled to $\frac{80}{260}$ of \$70 = \$21.53$\frac{1}{13}$.
" B " " " $\frac{90}{260}$ " \$70 = \$24.23$\frac{1}{13}$.
" C " " " $\frac{90}{260}$ " \$70 = \$24.23$\frac{1}{13}$.

In case the creamery is not co-operative and the proprietor wishes to fix a price for the cream according to the market price for butter, then all that is necessary is to fix the price for the butter fat. Good creamery butter should on the average contain 83 per cent of butter fat, then if butter is 20 cents per pound, butter fat would be worth 24.1 cents which is calculated by the following proportion:

83 : 100 : : price of butter : price of butter fat.
83 : 100 : : 20 cents : 24.1 cents.

When the cream is weighed and the per cent of butter fat determined the value of the cream is very easily calculated and the process should be readily understood by everyone. The product of the weight of the cream multiplied by the per cent of fat will be the weight of the fat and this product multiplied by the price of fat per pound will be the value of the cream.

BULLETIN No. 16.

INVESTIGATION ON THE FORAGING POWERS OF SOME AGRICULTURAL PLANTS FOR PHOSPHORIC ACID.*

PROF. WALTER BALENTINE.

Of recent investigations in plant nutrition those establishing the fact that leguminous plants are able to gather a portion of their nitrogen either directly or indirectly from the free nitrogen of the air are by far the most important, both from the scientific and the practical stand points.

These investigations settle a question that has attracted the attention of agricultural chemists for half a century. On the practical side the results enable us to say, that it is possible, by growing and feeding to farm animals such plants as peas and clover, to increase the stock of nitrogen for manurial purposes without resorting to the various expensive commercial nitrogenous materials.

Stating the results of these investigations concisely, it has been found that the leguminous plants are able to forage on the atmosphere for a portion of their nitrogen. Other plants either possess this power to a much less degree or not at all. If we look for a reason why this family of plants has attracted so much attention from scientists we find it in the fact that some of its members, the clovers especially, have been found in practical farming to be plants which by their growth on the soil, apparently leave it richer in plant food than before, and that farmers are actually able to produce more of grass, grain and potatoes when clover is used as one of the crops in rotation. It was to learn why a plant that takes up such large quantities of nitrogen as clover, should still leave the ground in a better condition for succeeding crops, that the sources of supply of nitrogen to the leguminous plants have been so carefully studied.

The value of the results of this work to the agriculture of the world cannot be over-estimated. There are, however, other problems in plant nutrition which deserve as careful study as the nitrogen question and which may yield results of equal practical importance.

*This bulletin is an extract from the report of Prof. Balentine in the Station report for 1893.—W. H. J.

All who have given especial attention to the subject of plant nutrition will, undoubtedly, agree that the foraging powers of plants for the elements contained in the ash, vary greatly. This fact is recognized by the majority of observing farmers, as is shown by the following common sayings: "Wheat requires a rich soil." "Corn is a gross feeder." "Oats are an exhaustive crop."

Notwithstanding that these views regarding the variation in foraging powers of different crops have been held by many for years, no one is prepared to say just how it is exerted. We are hardly ready to express an opinion whether the greater vigor of certain plants as compared to other species grown on the same soil is due to their superior foraging powers for all of the elements contained in their ash, or for one or more particular elements.

It seems quite as likely, however, that some plants are able to use certain soil compounds of potash or phosphoric acid, which are not available to other plants, as it did that the legumes were able to obtain nitrogen from sources that were not available to the grasses.

Believing that a study of the foraging powers of different agricultural plants would reveal facts of scientific interest, and at the same time of practical value to agriculture, the writer commenced a series of experiments, in the fall of 1892, designed to test the readiness with which different plants obtain their phosphoric acid from insoluble phosphates.

The reason why phosphoric acid was selected on which to make these first studies, in preference to any other substance was, that in practical manuring with crude phosphates, and also in their use in experimental work, different crops had apparently showed decided differences in their abilities to gather phosphoric acid from such a source.

EXPERIMENTAL METHODS.

In order to have the work as much as possible under control the experiments were conducted in boxes in the college forcing house. These boxes were of wood, fifteen inches square and twelve inches deep. For soil a fine sand was used, taken from a sand bank about three feet below the surface. This sand was drawn to the forcing house, screened and thoroughly mixed by repeatedly shoveling it over, after which a sample was taken and the contents of potash and phosphoric acid determined, with the following result: Potash, 0.096; phosphoric acid, 0.012 per cent.

One hundred and twenty pounds of sand were used in each box.

For each kind of plant studied nine boxes were used, in three sets of three boxes each.

The three boxes of each set received the following manuring per box:

SET I { 8.5 grams nitrate of soda = 1.36 grams nitrogen.
2.6 grams muriate of potash = 1.36 grams potash.

SET II { 8.5 grams nitrate of soda = 1.36 grams nitrogen.
2.6 grams muriate of potash = 2.36 grams potash.
17.0 grams South Carolina rock = 4.35 grams insoluble phosphoric acid.

SET III { 8.5 grams nitrate of soda = 1.36 grams nitrogen.
2.6 grams muriate of potash = 1.36 grams potash.
28.5 grams acidulated South Carolina rock = 4.46 grams phosphoric acid, three-fourths water-soluble.

It will be seen that all of the boxes were treated alike with reference to potash and nitrogen, that the plants grown in Set I were dependent on the phosphoric acid originally in the sand, that those grown in Set II had in addition 4.32 grams of phosphoric acid, mostly insoluble, supplied by crude finely ground South Carolina rock, and that those grown in the boxes of Set III had in addition to that originally contained in the sand 4.46 grams of phosphoric acid, mostly soluble, supplied in acidulated South Carolina rock.

The plants thus far studied have been wheat, barley, corn, beans, peas, potatoes and turnips.

After planting, the boxes were under the care of a man experienced in growing plants under glass. Water was supplied as it was believed to be needed. At the proper time the plants were thinned so that the boxes having the same kind of plants contained the same number of plants to the box.

The plants were allowed to grow to maturity. Immediately before harvesting, the crops were photographed and plates made showing the relative development of the plants produced. At the time of harvesting, the crops of wheat, barley, corn, peas and beans produced in each box were wieghed separately in an air dry condition, after which the amount of dry matter was determined in the combined crop of the three boxes of each set.

	Dry matter produced in each set of three boxes.						
	Wheat.	Barley.	Corn.	Beans.	Peas.	Potatoes.	Turnips.
	grams.	grams.	grams.	grams.	grams.	grams.	grams.
Only soil phosphoric acid....	76.9	201.5	39.5	15.7	112.7	113.3	154.4
Water-insoluble phosphoric acid	148.6	294.9	103.3	17.4	196.7	114.6	304.1
Mostly water-soluble phosphoric acid.......	296.3	508.1	291.0	69.8	228.6	223.7	270.4

While it may not be desirable to draw definite conclusions from so small an amount of data as is furnished by the above described experiments, there are some points which under the conditions of these experiments the results appear to bring out sharply.

1st. Different crops showed a decided difference in their powers of obtaining phosphoric acid from crude, finely ground South Carolina rock. Wheat, barley, corn, peas and turnips apparently appropriated the insoluble phosphoric acid from this source with greater or less ease, while beans and potatoes derived no benefit from it.

2d. The greatest practical advantage derived from the use of find ground South Carolina rock was with the turnips. With this crop a larger weight of dry matter and also a larger weight of fresh roots was obtained with insoluble phosphoric acid from the finely ground South Carolina rock than with an equal amount of soluble phosphoric acid from acidulated South Carolina rock.

3d. The indications point to a profitable use of finely ground South Carolina rock as a manure for barley and peas, as well as turnips.

4th. The acidulated Soute Carolina rock in these experiments apparently depressed the yield of grain with barley, while largely increasing the amount of straw. With wheat, both grain and straw were largely increased and in about the same proportion.

MAINE STATE COLLEGE,
ORONO, ME., Nov. 1, 1894.

NOTE. These investigations are being continued and will be kept up, if possible, until the results warrant definite conclusions. Additional data are already obtained and experiments are now in progress. W. H. J.

APPENDIX.

Annual Report of the State Pomological Society.

1894-95.

FARMINGTON, June 1, 1895.

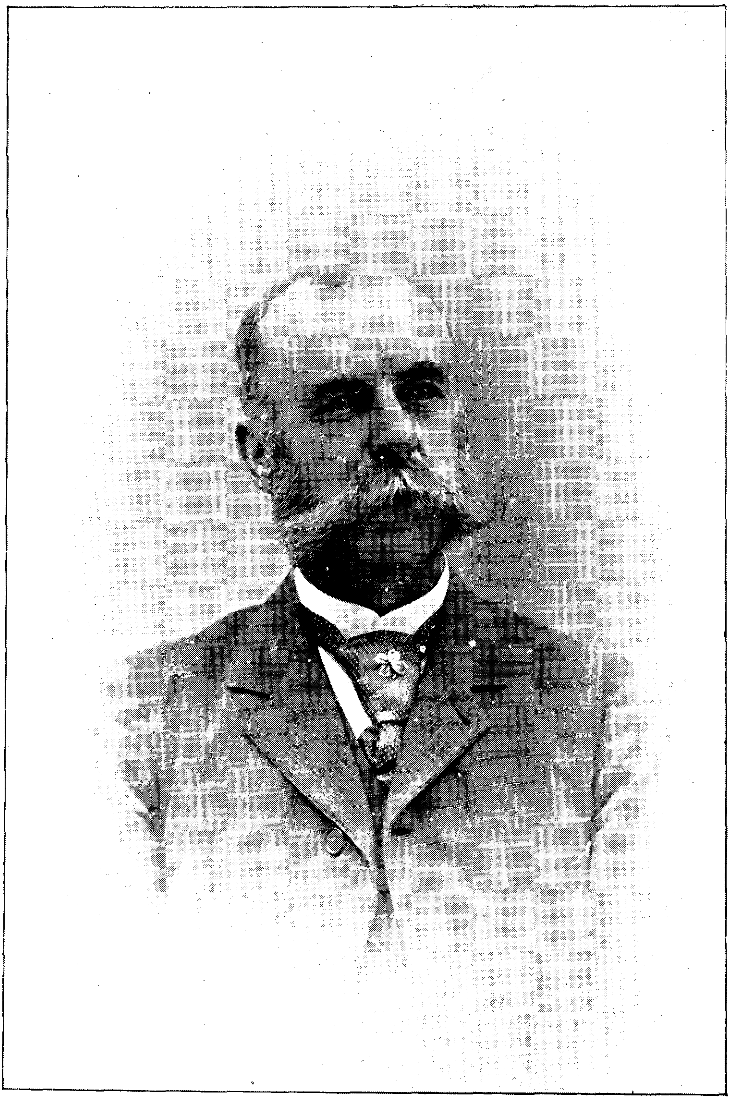
HON. B. WALKER MCKEEN,

Secretary Maine Board of Agriculture:—

I have the honor to transmit herewith for publication in the annual report of the agriculture of Maine, the transactions of the Maine State Pomological Society for the year 1894–95.

Yours respectfully,

D. H. KNOWLTON, *Secretary.*



CHARLES S. POPE,

MANCHESTER.

President Maine State Pomological Society 1884–1895.

[See page 121.]

REPORT OF THE SECRETARY.

Again it becomes the duty of your secretary to present an annual report of the transactions of the Society. During the year it has afforded me great pleasure and assured me of the progressive work in the State that a larger number all the while are becoming interested in fruit culture. Some men living secluded lives in rural homes, with little reading have often in years past, almost or quite ignored the words of horticultural societies. Unwilling to admit they do not know all there is of fruit culture, they behold the grand success of others, but they are like those in ancient days having eyes they see not. Many of these are now seeking knowledge which only their vanity in the past has denied them. As illustrative of this an intelligent fruit-grower inquired about the best varieties to plant. I gave him all the points I could, and he concluded by saying that he knew of no better variety than the Baldwin and he was going to set a lot of those in the spring. He remarked that one of the most successful orchards in the county was developed in this way, but failed to note that the cold of winter in this case twice froze back the tops before the trees were acclimated. The provoking thing in this particular case is that the man has grown fruit for nearly half a century. Other men realize the necessity for knowledge and are willing to seek it. This is one of the most encouraging features of the situation. For those who seek knowledge in these days will find it.

THE 1894 CROP.

The fruit crop in Maine has been large, though it can hardly be called a full crop. Many dealers have assured me that the crop is really much larger than in 1893. Travelling among the orchards in the autumn, one could not fail to notice that many of the trees were nearly barren. The statistics have been deceptive again, so much so that we are inclined to give them little consideration. Here in Maine the young trees, that are coming into bearing may explain the deception, but it is a significant fact that most of the large orchards bore small crops of fruit.

CAUSES OF BLIGHT.

In most parts of the State there was a full bloom, and just what caused the blight later has been much discussed and has not yet been fully settled. There is however the best of evidence that the scab fungus was one of the most active agents. The scab, or some other cause on trees in the writer's neighborhood acted apparently on the foliage, blossom and fruit. Early in the season the trees were dotted with yellow shrivelled leaves, and all through the season an examination of the leaves revealed the presence of disease, and scientific men assure us that it is the scab. Whatever it may be, if it continues a few years longer the indications are that many trees will die. Good results have followed spraying as will be seen in Professor Munson's paper, which forms a part of the present volume.

THE MARKET.

So far the market for apples has offered only low prices for fruit. A large part of the crop was sold early in the season at $1.50 for No. 1 fruit, but the buyers found no profit in paying that price. Apples from several points have been shipped in bulk to western cities. The only selection called for was that the red apples should be dumped into the same car. One lot contained at least twenty kinds. For fruit in this condition the buyers have paid $1 per barrel. These apples were shipped to western cities to be sold in bulk to hawkers. While the growers may get fair pay for their fruit, the reputation of Maine apples will surely suffer. Some political writers have charged a part of the low price to the action of the new tariff. Of course Canadian fruit now pays a less tariff than under the previous law, and to this extent the price must yield. Later in the winter fruit sold higher where it had been held by the growers.

STYLE OF PACKING.

The agents of English buyers are assuring the public of better prices for the remainder of the season. They also emphasize the new style of packing and claim that the fruit carefully wrapped in paper and packed in cases has brought satisfactory prices. The matter has often been discussed at our meetings, but our fruit growers have still to learn that an inferior apple is not improved by being concealed among better fruit, or wrapped in paper. On the other hand it would seem that Maine fruit has already suffered too much from dishonest packing to permit it in this case.

THE SOCIETY'S FUNDS.

The last legislature increased our appropriation to one thousand dollars. In consequence of an oversight in the engrossing of the appropriation bills only the usual sum of $500 was granted. After consulting among ourselves and with the governor and others the omission was sorely regretted. An extension of our work had been planned along various lines, and the conclusion was reached that the interests of the society and of the cause it represents made it necessary to carry forward the additional work. This has accordingly been done, and to-day we find the society in debt in consequence. Some of the State officials argued that the money in full ought to be paid to our society, but all seemed to agree that it was wise to increase our work. It is now proposed to ask the legislature to make good the deficiency by granting us the aid the last legislature overlooked. Later on the present legislature without dissent granted the funds to meet the deficiency.

FALL MEETING.

The fall meeting of the executive committee was held in Phillips, November 8th. The Grange cordially opened its hall for our use. The meeting was well advertised and well attended. There was an excellent display of fruit, showing in the most conclusive manner that favorable conditions exist among the hills of Franklin county for fruit culture. The exercises of the meeting were well received and reported by the papers. In the opinion of the Secretary this meeting was one of the most profitable held by the society.

STATE FAIR MEETING.

The public meeting held Thursday evening of the State Fair was a well attended one. On this occasion Mrs. Alonzo Towle of Freedom, N. H., delivered an entertaining address on flower culture, entitled "Behind the Hedge Row."

OUR WINTER MEETINGS.

Secretary McKeen has urged us to hold our winter meeting earlier, so that the work of the agricultural department may be closed up before the new year begins. The plan is a good one, and it will be a pleasure to co-operate with him. This year circumstances were adverse to this arrangement, owing to conditions that are not likely to exist in the future. The two organizations are working so harmoniously together in promoting the interests of agriculture that no effort should be spared to increase the efficiency of both.

ANNUAL EXHIBITION.

Our annual exhibition was held as usual with the State Agricultural Society in Lewiston. The first days of September are too early for a representative exhibition of fruits, but this year there was such a profusion of flowers that the exhibition as a whole was the fullest your Secretary has seen in the State. Mrs. Towle served as a judge on flowers and her work was entirely acceptable. We were unable to obtain a competent judge on fruits within a reasonable distance outside the State. The exhibitors are much better satisfied when judging can be done by experts, and in this case it was no fault of the officers that it was not done so at this exhibition.

Several important changes were made in the premium list, one of which was a premium on each correctly named variety of apples and pears. The object of the premium was to secure a full exhibition of the fruit grown in Maine. We show in our list a preference by specifying certain varieties on which we pay a one dollar premium, and for others not given in our list and correctly named we give a fifty-cent premium. This brought out a large number of varieties that heretofore have not been shown. In all 111 varieties were exhibited. The cost to the society was not very great, and the exhibition is made much more valuable to visitors. Several objects of interest were shown by the devotees of horticulture. Mr. Edward K. Whitney, one of our oldest and most successful fruit growers, sent in for our examination a plate of well-grown figs. They were examined with great interest, and many wishes were expressed for the health and happiness of the exhibitor. Some freaks in fruit culture were presented to the Secretary. One of these was a Sops-of-Wine apple which grew on a tree whose limbs interlaced a Flemish Beauty pear. In shape it was a perfect pear, but in other respects it was an apple. In another case an apple was shown, the blossom end of which was a beautiful red Baldwin, and the stem end a well-developed Russet. These freaks suggest that in years to come some skilful horticulturist may be able to bring forth new fruits, that may excel those we now have. When we are able to work more fully with nature's laws we are likely to be rewarded by fruits far better than the present favorites.

AGENCIES AT WORK.

There has been an active and cordial co-operation on the part of the press in the State. The Secretary desires to express his personal gratitude to the Maine Farmer, Lewiston Journal and Kennebec Journal in particular. Special prominence has been given to horticultural subjects by the gentlemen having in charge the agricultural departments of these journals. They have not only given fruit matters intelligent consideration, but in many cases have diligently and ably investigated for themselves, and they have generously given the public the benefit of these labors. The Lewiston Journal recently published in answer to the inquiries of its agricultural editor results reached by fruit growers of the State in spraying for the destruction of fungi and insects. The experience of several fruit growers was found very readable and the conclusions will prove helpful to others. So much is found in the papers on fruit culture, prepared by writers or speakers from other sections of the country, it is worth a great deal to have these conclusions reached on Maine farms and in a Maine climate. Even those speakers who visit us and talk of fruit culture, forget that they are away from home, and tell us just how these things are done in New York or New Jersey. It is not an easy task to adapt their talk and theories to Maine conditions. Information was sought upon this question, "Can farmers afford to raise apples for $1.25 a barrel?" It was ably discussed by several writers and the conclusion reached that intelligent care bestowed upon orchards in Maine would pay as well or better at this price than many other farm crops. The Secretary would add to this, that with our low priced orchard land the minimum cost of raising apples has not yet been reached. It is not known how cheaply apples may be grown in Maine, and until this feature of the problem is considered it is largely guess work. The fruit growers of

Maine are squarely facing the question, and some of us may live to know how much our fertile hillsides, under the skilful manipulation of the horticulturists, may be made to produce. We are just getting down to the question in good shape, and the next four years are promising many interesting revelations.

Our society is also indebted to these and other journals in the State, which have published our notices and full reports of our meetings, and we find with us at this our annual meeting a full representation of the press. We are glad to welcome them here and to greet them as co-laborers in carrying forward the great industry which we represent.

We were gratified at the full reports published of our annual meeting. We are always glad to welcome the members of the press at our meetings, but we recognize them as co-laborers in carrying forward the great industry which we represent.

D. H. KNOWLTON, *Secretary.*

OFFICERS FOR 1895.

President.

JOHN W. TRUE, New Gloucester.

Vice Presidents.

S. H. DAWES, Harrison.

D. P. TRUE, Leeds Center.

Secretary.

D. H. KNOWLTON, Farmington.

Treasurer.

CHARLES E. WHEELER, Chesterville.

Executive Committee.

The President and Secretary, *ex-officio*; A. E. Andrews, Gardiner; W. M. Munson, Orono; C. H. George, Hebron.

Trustees.

Androscoggin	County,	Charles L. Emerson, South Turner.
Aroostook	"	J. W. Dudley, Castle Hill.
Cumberland	"	S. R. Sweetser, Cumberland Center.
Franklin	"	Herman Corbett, Farmington.
Hancock	"	C. G. Atkins, Bucksport.
Kennebec	"	E. A. Lapham, Pittston.
Knox	"	Alonzo Butler, Union.
Lincoln	"	H. J. A. Simmons, Waldoboro'.
Oxford	"	S. M. King, South Paris.
Penobscot	"	C. A. Arnold, Arnold.
Piscataquis	"	H. L. Leland, East Sangerville.
Sagadahoc	"	A. P. Ring, Richmond.
Somerset	"	James S. Hoxie, North Fairfield.
Waldo	"	A. M. Mansur, East Dixmont.
Washington	"	———.
York	"	John Hanscom, Saco.

Member of Experiment Station Council.

Chas. S. Pope, Manchester.

Committee on Nomenclature.

Z. A. Gilbert, North Greene; D. P. True, Leeds Center; C. M. Weston, Belgrade.

Committee on New Fruits.

A. S. Ricker, Turner; E. C. Hackett, West Gloucester; Willis A. Luce, South Union.

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
Andrews, Charles E ... Auburn
Arnold, C. A ... Arnold
*Atherton, H. N ... Hallowell
Atherton, Wm. P ... Hallowell
Atkins, Charles G ... Bucksport
Atwood, Fred ... Winterport
Averill, David C ... Temple
Bailey, W. G ... Freeport
Bennoch, John E ... Orono
Boardman, Samuel L ... Augusta
Briggs, D. J ... South Turner
Briggs, John ... Turner
Burr, John ... Freeport
Butler, Alonzo ... Union
*Carter, Otis L ... Etna
Chase, Henry M., 14 Quincy St., Portland
Chase, Martin V. B ... Augusta
*Clark, Eliphalet ... Portland
Cole, Horatio G ... Boston, Mass
Corbett, Herman ... Farmington
Crafts, Moses ... Auburn
*Crosby, William C ... Bangor
Dana, Woodbury S ... Portland
Dawes, S. H ... Harrison
DeRocher, Peter ... Bradentown, Fla
Dirwanger, Joseph A ... Portland
Dunham, W. W ... North Paris
Dyer, Milton ... Cape Elizabeth
*Emerson, Albert ... Bangor
Emerson, Charles L ... South Turner
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
Goddard, Lewis C ... Woodfords
*Godfery, John E ... Bangor
Gurney, Lemuel ... Hebron
Hackett, E. C ... West Gloucester
Hanscom, John ... Saco
Harlow, S. C ... Bangor
*Harris, N. C ... Auburn
Harris, N. W ... Auburn
Harris, William M ... Auburn
Harvey, F. L ... Orono
*Hersey, T. C ... Portland
Hobbs, M. Curtis ... West Farmington
*Hoffses, Elmas ... Warren
Hoxie, James S ... North Fairfield
Hoyt, Mrs. Francis ... Winthrop
Ingalls, Henry ... Wiscasset
Jackson, F. A ... Winthrop
*Jewett, George ... Portland
Johnson, Isaac A ... Auburn
*Jordan, Francis C ... Brunswick
*Kenniston, E. H ... Arnold
Knowlton, D. H ... Farmington
Lapham, E. A ... Pittston
Lombard, Thurston M ... Auburn
*Low, Elijah ... Bangor
*Low, S. S ... Bangor
Luce, Willis A ... South Union
McLaughlin, Henry ... Bangor
Merrill, T. M ... West Gloucester
*Metcalf, M. J ... Monmouth
Moody, Charles H ... Turner
Moore, William G ... Monmouth
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

*Deceased.

LIFE MEMBERS—CONCLUDED.

Richards, John T. ....Gardiner	Strattard, Mrs. A. B... ....Monroe
*Richardson, J. M. ....Gardiner	Sweetser, S. R. ......Cumberland Center
Ricker, A. S. ....Turner	*Taylor, Joseph ....Belgrade
Roak, George M. ....Auburn	Taylor, Miss L. L., (Lakeside) Belgrade
Robinson, Henry A...... ...... Foxcroft	Thomas, William W., Jr.........Portland
Rolfe, Samuel ....Portland	Thomas, D. J. .... North Auburn
Sanborn, Miss G. P ....Augusta	Tilton, William S. ....Boston, Mass
Sawyer, Andrew S.... . Cape Elizabeth	Townsend, Mrs. B. T............Freeport
Sawyer, George B...... .... ..Wiscasset	True, Davis P...............Leeds Center
*Shaw, Stillman W.. ......West Auburn	True, John W. ....New Gloucester
Simmons, H. J. A. ....Waldoboro'	*Varney, James A...The Dalles, Oregon
Skillings, C. W. ....North Auburn	Vickery, James.................Portland
*Smith, Alfred ....Monmouth	Vickery, John.....................Auburn
Smith, Henry S. ....Monmouth	Wade, Patrick ....Portland
Starrett, L. F. ....Warren	Walker, Charles S. ....Peru
Stetson, Henry ....Auburn	Waterman, Willard H. .....East Auburn
*Stetson, Isaiah .... Bangor	*Weston, James C. ....Bangor
Stilphen, Asbury C. ....Gardiner	Wharff, Charles S. ....Gardiner
Stanley, Charles ....Winthrop	Wheeler, Charles E. ....Chesterville
Stanley, O. E. ....Winthrop	Whitney, Edward K ....Harrison
Staples, G. K. ....Temple	Woodard, Mrs. S. M... ....Gardiner
Strout, S. F. ....West Falmouth	Woodman, George W.......... Portland

ANNUAL MEMBERS, 1894.

Bickford, A. K ....Monmouth	Nowell, F. E......................Fairfield
Chandler, Mrs. Lucy A ....Freeport	Prescott, G. N. ....East Monmouth
Cummings, Mrs. Anthony.......Auburn	Ridley, B. H ....Jay
Cobb, J. O ....Union	Ring, A. P.. ....Richmond Corner
Eastman, A. A...... ....Dexter	Robbins, R. B. ....Union
Glover, G. A ....Naples	Shurtleff, S. G ....South Livermore
Grover, Mrs. F. D ....Bean's Corner	Sleeper, F. H. ....Lewiston
Hawkins, M. P. ....Auburn	Snow, G. W. ....Newburg
Judkins, Charles H. ....Chesterville	Spratt, Lillian A ....Kenduskeag
Keith, Walter E ....Winthrop	Stoddard, Edith A ... .Belfast
King, S. M ....South Paris	Tarr, E ....Castle Hill
Klusener, Mrs. E .... Auburn	Tolman, I. B ....Union
Leland, H. L. ....East Sangerville	Toothaker, L. P. ....Dixmont
Leland, W. E ....East Sangerville	Varney, F. L ....East Lowell
Lemont, J. M ....West Bath	Waterman, Mrs. C. E. ......East Auburn
Merrow, J. H ....South Smithfield	Willard, S. D. ....Geneva, N. Y
Miller, Chas. ....East Union	Wright, Fred. ....Bath
Munson, W. M ....Orono	Wright, L. E ....West Bath

ANNUAL MEMBERS, 1895.

Crooker, W. W...... .. ..Monson	Munson, W. M ....Orono
Judkins, Charles H. ....Chesterville	Norris, J. F. ....Foxcroft
Larrabee, O. L. ....West Levant	Ridley, B. H ....Jay
Leland, H. L..... ......East Sangerville	

TREASURER'S REPORT.

Statement of the Financial Condition of the Maine State Pomological Society for the Year ending December 31, 1894.

RECEIPTS.

Cash on hand January 1st, 1894	$ 92 65
From the State Agricultural Society	500 00
From the State of Maine	538 64
From life membership	40 00
From annual membership	39 00
Interest from permanent fund	38 00
Loan	600 00
	$1,848 29

EXPENDITURES.

Premiums	$789 45
Loan	300 00
Salary of the Secretary for 1893	140 00
Expense of officers	132 47
Expense of Executive Committee	115 29
Expense of State Fair and plants for children	87 47
Printing and binding	61 71
Judges at Fair	27 00
Interest on loan	1 25
Cash on hand December 31, 1894	193 65
	$1,848 29

FINANCIAL CONDITION.

ASSETS.

Bounty due from the State	$1,000 00
Property owned by Society	200 00
Permanent fund	719 73
Cash on hand	193 65
	$2,113 38

LIABILITIES.

Due on loan, First National Bank, Farmington	$600 00
Outstanding orders	125 00
	$725 00

PERMANENT FUND.

CREDIT.

By fees of 114 life members to December 31, 1893	$1,140 00
of Lewis C. Goddard	10 00
of Herman Corbett	10 00
of Miss G. P. Sanborn	10 00
of Mrs. B. T. Townsend	10 00
	$1,180 00

DEBIT.

To deposit in Wiscasset Bank	$ 19 73
Farmington National Bank stock	400 00
Merchants' National Bank stock, Gardiner	200 00
Farmington water stock	100 00
due from the Society December 31, 1895	460 27
	$1,180 00

CHARLES E. WHEELER, *Treasurer*.

List of Premiums Awarded at the Annual Exhibition.

Class 1—APPLES.

For best general exhibition of apples: S. H. Dawes, Harrison, first, $15; C. I. Perley, South Vassalboro, second, $10; Walter E. Keith, Winthrop, third, $6; B. H. Ridley, Jay, gratuity, $5.

For best general exhibition of apples grown in Androscoggin county D. J. Briggs, South Turner, first, $8; D. P. True, Leeds Center, second, $6.

For same in Aroostook county: E. Tarr, Castle Hill, first, $8.

For same in Cumberland county: S. H. Dawes, first, $8; J. W. True, New Gloucester, second, $6.

For same in Franklin county: M. C. Hobbs, West Farmington, first, $8; Herman Corbett, Farmington, second, $6; G. K. Staples, Temple, third, $3.

For same in Kennebec county: J. Pope, Manchester, first, $8; W. R. Wharff, Gardiner, second, $6; R. H. Gardiner, Gardiner, third, $3.

For same in Knox county: Alonzo Butler, Union, first, $8; Willis A. Luce, South Union, second, $6.

For same in Lincoln county: H. J. A. Simmons, Waldoboro, first, $8.

For same in Oxford county: C. H. George, Hebron, first, $8; S. M. King, South Paris, second, $6; Lemuel Gurney, Hebron, third, $3.

For same in Penobscot county: C. A. Arnold, Arnold, first, $8; L. P. Toothaker, Dixmont, second, $6; G. W. Snow, Newburg, third, $3.

For same in Piscataquis county: W. E. Leland, East Sangerville, first, $8; H. L. Leland, East Sangerville, second, $6.

For same in Sagadahoc county: Frederick Wright, Bath, first, $8; L. E. Wright, Woolwich, second, $6; J. M. Lemont, West Bath, third, $3.

For same in Somerset county: J. S. Hoxie, North Fairfield, first, $8; F. E. Nowell, Fairfield, second, $6; J. H. Merrow, South Smithfield, third, $3.

For same in Waldo county: Mrs. A. B. Strattard, Monroe, second, $6.

Collection Crab Apples: J. S. Hoxie, first, $1; Alonzo Butler, second, 50c.

SINGLE PLATES.

Baldwins: A. P. Ring, Richmond Corner, first, $5; R. H. Gardiner, second, $3; S. H. Dawes, third, $2.

Gravenstein: A. S. Ricker, Turner, first, $3; S. H. Dawes, second, $2; D. J. Briggs, third, $1.

Hubbardston Nonsuch: J. Pope, first, $3; W. R. Wharff, second, $2.

Northern Spy: R. H. Gardiner, first, $3; C. I. Perley, second, $2; W. A. Luce, third, $1.

Rhode Island Greening: A. K. Bickford, Monmouth, first, $5; A. S. Ricker, second, $3; Lemuel Gurney, third, $2.

Roxbury Russets: Walter E. Keith, first, $3; R. H. Gardiner, second, $2; G. N. Prescott, East Monmouth, third, $1.

Talman's Sweet: A. S. Ricker, first, $3; Alonzo Butler, second, $2; S. H. Dawes, third, $1.

Tompkins King: S. H. Dawes, first, $3; W. R. Wharff, second, $2; J. W. True, third, $1.

Yellow Bellflower: R. H. Gardiner, first, $3; W. R. Wharff, second, $2; J. H. Merrow, third, $1.

Alexander: M. C. Hobbs, first, $1; S. H. Dawes, second, 50c.

American Golden Russet: H. J. A. Simmons, first, $1; W. A. Luce, second, 50c.

Ben Davis: W. E. Rose, Greene Corner, first, $1; Lemuel Gurney, second, 50c.

Deane: H. Corbett, first, $1; M. C. Hobbs, second, 50c.

Duchess of Oldenburg: S. H. Dawes, first, $1; M. P. Hawkins, second, 50c.

Early Harvest: C. A. Arnold, first, $1; H. J. A. Simmons, second, 50c.

Fallawater: J. Pope, first, $1; C. I. Perley, second, 50c.

Fall Harvey: C. H. Judkins, Chesterville, first, $1; A. S. Ricker, second, 50c.

Fameuse: A. K. Bickford, first, $1; S. M. King, second, 50c.

Garden Royal: B. H. Ridley, Jay, first, $1; T. J. Wheeler, Chesterville, second, 50c.

Granite Beauty: C. I. Perley, first, $1; H. J. A. Simmons, second, 50c.

Jewett's Fine Red: S. H. Dawes, first, $1; F. E. Nowell, second, 50c.

King Sweeting: F. E. Nowell, first, $1; J. S. Hoxie, second, 50c.

Large Yellow Bough: F. H. Sleeper, Lewiston, first, $1; I. B. Tolman, Union, second, 50c.

McIntosh Red: Chas. Miller, Union, first, $1; C. I. Perley, second, 50c.

Milding: C. I. Perley, first, $1; H. J. A. Simmons, second, 50c.

Mother: R. H. Gardiner, first, $1; A. J. Kenniston, second, 50c.

Munson Sweet: H. Corbett, first, $1; Hall and Wheeler, second, 50c.

Peck's Pleasant: R. H. Gardiner, first, $1.

Pomme Royale: C. H. George, second, 50c.

Porter: S. H. Dawes, first, $1; A S. Ricker, second, 50c.

Pound Sweet: S. H. Dawes, first, $1; J. M. Lemont, second, 50c.

President: A. S. Ricker, first, $1; F. E. Nowell, second, 50c.

Primate: G. K. Staples, first, $1; J. S. Hoxie, second, 50c.

Pumpkin Sweet: Walter E. Keith, first, $1; J. Pope, second, 50c.

Red Astrachan: H. Corbett, first, $1; S. H. Dawes, second, 50c.

Russell: B. H. Ridley, first, $1.

Somerset: F. E. Nowell, first, $1; J. H. Merrow, second, 50c.

Stark: J. W. True, first, $1.

Starkey: J. Pope, first, $1; C. I. Perley, second, 50c.

Tetofsky: S. H. Dawes, first, $1; J. S. Hoxie, second, 50c.

Wagener: G. W. Snow, first, $1; S. H. Dawes, second, 50c.

Wealthy: J. W. True, first, $1; I. B. Tolman, second, 50c.

William's Favorite: S. M. King, first, $1; W. A. Luce, second, 50c.

Winthrop Greening: E. A. Lapham, Pittston, $1; R. H. Gardiner, second, 50c.

Yellow Transparent: C. H. George, first, $1; M. C. Hobbs, second, 50c.

Sweet Russet: A. S. Ricker, second, 25c.

Newtown Pippin: I. B. Tolman, first, 50c.

Westfield Seeknofurther: S. H. Dawes, first, 50c; C. H. George, second, 50c.

Orange Sweet: C. H. Judkins, first, 50c; Hall and Wheeler, second, 25c.

Maiden's Blush: A. K. Bickford, first, 50c; F. E. Nowell, second, 25c.

Minister: A. S. Ricker, first, 50c; Alonzo Butler, second, 25c.

Ribston Pippin: A. S. Ricker, first, 50c; E. A. Lapham, second, 25c.

Kilham Hill: A. S. Ricker, first, 50c; J. S. Hoxie, second, 25c.

Twenty Ounce: D. P. True, first, 50c; W. S. Phinney, Standish, second, 25c.

Gloria Mundi: B. H. Ridley, first, 50c; D. P. True, second, 25c.

Swaar: D. P. True, first, 50c.

Golden Ball: J. M. Lemont, first, 50c.

Mann: G. N. Prescott, East Monmouth, first, 50c; J. M. Lemont, second, 25c.

Sutton Beauty: S. G. Shurtleff, South Livermore, first, 50c.

Princess Louise: S. G. Shurtleff, first, 50c.

Shiawassa: S. G. Shurtleff, first, 50c.

Geneva Pippin: J. S. Hoxie, first, 50c.

Fall Jenneting: S. H. Dawes, first, 50c; J. S. Hoxie, second, 25c.

Pennock: J. S Hoxie, first, 50c; F. E. Nowell, second, 25c.

Grimes' Golden: C. H. George, first, 50c; Alonzo Butler, second, 25c.

Gano: J. S. Hoxie, first, 50c.

Pomme Gris: J. S. Hoxie, first, 50c.

Pewaukee: E. A. Lapham, first, 50c; Hall and Wheeler, second, 25c.

Benoni: Charles Miller, East Union, first, 50c; J. S. Hoxie, second, 25c.

Gideon: J. S. Hoxie, first, 50c.

Spitzenberg: S. H. Dawes, first, 50c; C. I. Perley, second, 25c.

New York Pippin: S. H. Dawes, first, 50c.

Lady Sweet: C. H. George, first, 50c; F. E. Nowell, second, 25c.

Bailey Sweet: S H. Dawes, first, 50c.

River: B. H. Ridley, first, 50c; F. E. Nowell, second, 25c.

Fall Greening: I. B. Tolman, first, 50c.

Black Oxford: A. K. Bickford, first, 50c; C. H. Judkins, second, 25c.

Fall Orange: S. M. King, first, 50c.

Maxim Seedling: S. M. King, first, 50c.

Garden Beauty: S. M. King, first, 50c

York Imperial: S. M. King, first, 50c.

Foundling: S. M. King, first, 50c; C. H. George, second, 25c.

Franklin Sweet: Hall & Wheeler, first, 50c.

St. Lawrence: Alonzo Butler, first, 50c; F. E. Nowell, second, 25c.

Caleph Sweet: B. H. Ridley, first, 50c.

Parker Sweet: B. H. Ridley, first, 50c.

Mammoth: B. H. Ridley, first, 50c.

Acme: B. H. Ridley, first, 50c.

Hurlbut: G. W. Snow, first, 50c; Alonzo Butler, second, 25c.

August Greening: F. E. Nowell, first, 50c.

Blue Pearmain: C. I. Perley, first, 50c; W. A. Luce, second, 25c.

Moses Wood: C. I. Perley, first, 50c.

Poughkeepsie Russet: Alonzo Butler, first, 50c; W. A. Luce, second, 25c.

Hightop Sweet: F. E. Nowell, first, 50c.

Sops-of-Wine: Alonzo Butler, first, 50c; F. E. Nowell, second, 25c.

Haas: C. A. Arnold, first 50c.

American Golden Pippin: Alonzo Butler, first, 50c.

Colvert: Alonzo Butler, first, 50c; F. E. Nowell, second, 25c.

Hawley: Alonzo Butler, second, 25c.

Jersey Sweet: Alonzo Butler, first, 50c.

Rambo: Alonzo Butler, first, 50c.

Keswick Codlin: Alonzo Butler, first, 50c.

Cooper's Market: Alonzo Butler, first, 50c; F. E. Nowell, second, 25c.

Liscomb: W. A. Luce, first, 50c.

Golden Sweet: W. A. Luce, first, 50c.

Garden Sweet: E. A. Lapham, first, 50c.

Fall Pippin: E. A. Lapham, first, 50c; C. H. George, second, 25c.

Superb Sweet: C. H. Judkins, first, 50c.

Strawberry Sweet: Alonzo Butler, first, 50c.

Chenango Strawberry: C. H. George, first, 50c.

English Russet: C. H. George, first, 50c.

Class 2—PEARS.

For best general exhibition of pears: S. H. Dawes, first, $10; C. I. Perley, second, $8; D. J. Briggs, third, $5.

Clapp's Favorite: A. S. Ricker, first, $3; S. H. Dawes, second, $2.

Bartlett: S. H. Dawes, first, $3; A. S. Ricker, second, $2.

Belle Lucrative: G. N. Prescott, first, $1; Walter E. Keith, second, 50c.

Beurre d'Anjou: S. H. Dawes, first, $1; Walter E. Keith, second, 50c.

Beurre Bosc: J. W. True, first, $1.

Beurre Superfin: D. P. True, first, $1; S. H. Dawes, second, 50c.

Beurre Clairgeau: S. H. Dawes, first, $1; G. N. Prescott, second, 50c.

Buffum: Walter E. Keith, first, $1; S. H. Dawes, second, 50c.

Doyenne Boussock: S. H. Dawes, first, $1; C. H. George, second, 50c.

Duchesse d'Angouleme: S. H. Dowes, first, $1; Alonzo Butler, second, 50c.

Fulton: D. P. True, first, $1.

Goodale: C. I. Perley, first, $1.

Howell: C. I. Perley, first, $1; S. H. Dawes, second, 50c.

Louise Bonne de Jersey: S. H. Dawes, first, $1; D. P. True, second, 50c.

Seckel: A S. Ricker, first, $1; S. H. Dawes, second, 50c.

Sheldon: S. H. Dawes, first, $1; A. S. Ricker, second, 50c.

Souvenir du Congress: S. H. Dawes, first, $1; D. P. True, second, 50c.

Lawrence: Lemuel Gurney, first, $1; S. H. Dawes, second, 50c.

Vicar of Wakefield: Alonzo Butler, first, 50c; D. P. True, second, 50c.

Beurre d'Amalis: Walter E. Keith, first, 50c; H. J. A. Simmons, second, 50c.

Bloodgood: S. H. Dawes, first, 50c.

Rostiezer: S. H. Dawes, first, 50c.

Brandywine: S. H. Dawes, first, 50c.

Rutter: S. H. Dawes, first, 50c.

Tyson: S. G. Shurtleff, first, 50c; S. H. Dawes, second, 25c.

Gurber: S. H. Dawes, first, 50c.

Kieffer: S. H. Dawes, first, 50c; D. P. True, second, 25c.

Edmunds: Walter E. Keith, first, 50c.

Margaret: S. G. Shurtleff, second, 25c.

Eastern Belle: J. S. Hoxie, first, 50c.

Flemish Beauty: A. J. Kenniston, Simpson's Corner, first, 50c; S. H. Dawes, second, 25c.

Glout Morceau: C. I. Perley, first, 50c.

Swan's Orange: C. I. Perley, second, 25c.

Ellis: D. P. True, first, 50c.

Class 3—GRAPES.

Collection open air grapes: S. H. Dawes, first, $5; G. A. Glover, Naples, second, $3.

Sweetwater: A. P. Ring, first, $1.

Class 4—PLUMS.

For best general exhibition: S. H. Dawes, first, $6; W. A. Luce, second, $4; D. P. True, third, $2.

Bavay's Green Gage: W. A. Luce, second, 50c.

Bradshaw: W. A. Luce, first, $1; D. H. Knowlton, Farmington, second, 50c.

Coe's Golden Drop: S. H. Dawes, first, $1; C. H. George, second, 50c.

Prince's Imperial Gage: H. J. A. Simmons, first, $1; Charles Miller, second, 50c.

Purple Gage: Lemuel Gurney, first, $1; D. P. True, second, 50c.

Red Gage: D. P. True, first, $1.

Guii: A. A. Eastman, Dexter, first, $1.

Jefferson: J. W. True, first, $1; S. H. Dawes, second, 50c.

Lawrence: S. H. Dawes, first, $1.

Lombard: S. H. Dawes, first, $1; C. H. George, second, 50c.

Magnum Bonum: M. P. Hawkins, first, $1.

McLaughlin: J. W. True, first, $1; A. A. Eastman, second, 50c.

Moore's Arctic: W. A. Luce, first, $1; A. A. Eastman, second, 50c.

Quackenbos: W. A. Luce, first, $1.

Washington: D. H. Knowlton, first, $1.

Yellow Egg: Lemuel Gurney, first, $1; J. W. True, second, 50c.

Abundance: S. G. Shurtleff, gratuity, $1.

Fellemberg: S. G. Shurtleff, gratuity, $1; D. H. Knowlton, gratuity, 50c.

Class 5—SMALL FRUITS IN GLASS.

Currants: A. A. Eastman, first, 50c.

Gooseberries: A. A. Eastman, first, 50c.

Raspberries: A. A. Eastman, first, 50c.

Strawberries: A. A. Eastman, first, 50c.

Class 6—MISCELLANEOUS.

Quinces: S. H. Dawes, gratuity, $1.

Figs: E. K. Whitney, Harrison, gratuity, $1.

Blackberries: Alonzo Butler, gratuity, $1.

Collection Canned Fruit, etc.: Mrs. H. Corbett, first, $8; Mrs. F. D. Grover, Bean's Corner, second, $5.

Canned Blackberries: Mrs. D. P. True, first, 50c; Mrs. Francis Hoyt, Winthrop, second, 25c.

Canned Blueberries: Mrs. D. P. True, first, 50c.

Canned Gooseberries: Mrs. F. Hoyt, first, 50c; Mrs. D. P. True, second, 25c.

Canned Peaches: Mrs. H. Corbett, first, 50c; Mrs. F. Hoyt, second, 25c.

Canned Pears: Mrs. F. Hoyt, first, 50c; Mrs. H. Corbett, second, 25c.

Canned Plums: Mrs. H. Corbett, first, 50c; Mrs. D. P. True, second, 25c.

Canned Quinces: Mrs. F. Hoyt, first, 50c; Mrs. H. Corbett, second, 25c.

Canned Raspberries: Mrs. F. Hoyt, first, 50c.

Canned Strawberries: Mrs. F. Hoyt, first, 50c; Mrs. H. Corbett, second, 25c.

Canned Tomatoes: Mrs. F. Hoyt, second, 25c.

Preserved Apples: Mrs. F. Hoyt, second, 25c.

Preserved Currants: Mrs. F. Hoyt, first, 50c.

Preserved Cherries: Miss E. B. Butler, Union, first, 50c; Mrs. F. Hoyt, second, 25c.

Preserved Pears: Mrs. F. Hoyt, first, 50c; Mrs. H. Corbett, second, 25c.

Preserved Plums: Mrs. F. Hoyt, first, 50c; Mrs. D. P. True, second, 50c.

Preserved Quince: Mrs. F. Hoyt, first, 50c; Mrs. H. Corbett, second, 25.

Preserved Raspberries: Miss E. B. Butler, first, 50c; Mrs. H. Corbett, second, 25c.

Preserved Strawberries: Mrs. H. Corbett, first, 50c; Mrs. F. Hoyt, second, 25c.

Assorted Pickles: Mabel E. Grover, Bean's Corner, first, 50c; Mrs. F. Hoyt, second, 25c.

Tomato Catsup: Mrs. F. Hoyt, first, 50c.

Collection Apple Jellies: Mrs. H. Corbett, first, $2; Mrs. F. D. Grover, second, $1.

Apple Jelly: Mrs. F. D. Grover, first, $1; Mrs. H. Corbett, second, 50c.

Crab Apple Jelly: Mrs. H. Corbett, first, 50c; Mrs. F. Hoyt, second, 25c.

Currant Jelly: Mrs. F. Hoyt, first, 50c; A. A. Eastman, second, 25c.

Grape Jelly: Mrs. F. Hoyt, second, 25c.

Quince Jelly: Mrs. H. Corbett, first, 50c; Mrs. F. Hoyt, second, 25c.

Raspberry Jelly: Mrs. F. Hoyt, second, 25c.

Rhubarb Jelly: Mrs. F. Hoyt, second, 25c.

Strawberry Jelly: Mrs. H. Corbett, first, 50c; Mrs. F. Hoyt, second, 25c.

Maple Syrup: C. H. George, first, $1; Joseph Hibbs, Hebron, second, 50c.

Evaporated Apples: Walter Keith, first, $3.

Celery Relish: S. B. Scribner, Lewiston, gratuity, 50c.

Maple Sugar: Lemuel Gurney, gratuity, 25c.

Tomato Pickles: Mrs. F. A. Conant, Lewiston, gratuity, 25c.

Preserved Tomato: Mrs. F. A. Conant, gratuity, 50c.

Strawberry Jam: Mrs. F. A. Conant, gratuity, 25c.

Class 7—FLOWERS.

Display of Cut Flowers: (professional) C. S. Goddard & Son, Woodfords, first, $10.

Display of Cut Flowers: Mrs. Charles Stanley, Winthrop, first, $10; Mrs. B. T. Townsend, Freeport, second, $8; Mrs. A. B. Strattard, Monroe, third, $5.

Exhibition of Dahlias: Mrs. Charles Stanley, first, $2; Mrs. B. T. Townsend, second, $1.

Chinese Pinks: Charles S. Walker, Peru, first, $2; Iola Agnes Walker, Peru, second, $1.

Lilies: Mrs. B. T. Townsend, second, $1.

Asters: Mrs. B. T. Townsend, first, $1; Mrs. S. T. Goodspeed, Turner Centre, second, 50c.

Pansies (named): Mrs. A. B. Strattard, second, $1.

Pansies: Mrs. H. Corbett, first, $1.

Zinnias: Mrs. B. T. Townsend, first, $1; Mrs. Francis Hoyt, second, 50c.

Phlox Drummondii: Mrs. B. T. Townsend, first, $2; Willard H. Waterman, East Auburn, second, $1.

Stocks: Lucy A. Chandler, Freeport, first, $1; Mrs. G. K. Staples, second, 50c.

Sweet Peas: E. C. Pope, Manchester, first, $1; Mrs. S. T. Goodspeed, second, 50c.

Balsams: Mrs. F. Hoyt, first, $1; Mrs. Chas. Stanley, second, 50c.

Gladioli: Lucy A. Chandler, first, $2; Mrs. H. Corbett, second, $1.

Petunias: Mrs. B. T. Townsend, first, $1; Mrs. A. B. Strattard, second, 50c.

Verbenas: Lucy A. Chandler, first, $1; Mrs. F. Hoyt, second, 50c.

Vase of Cut Flowers: Mrs. E. Klusener, Auburn, first, $3; Mrs. H. Corbett, second, $2; Mrs. Anthony Cummings, Auburn, $1.

Six Button-hole Bouquets: Perez S. Burr, Freeport, second, $1.

Professional Floral Design: Miss G. P. Sanborn, Augusta, first, $8; C. S. Goddard & Son, second, $5.

Corsage Bouquet: Perez S. Burr, first, $2.

Amateur Floral Design: Lucy B. Burr, Freeport, first, $5; Mrs. A. B. Strattard, second, $3.

Dish of Cut Flowers: Mrs. H. Corbett, first, $2; Mrs. F. Hoyt, second, $1.

Basket of Cut Flowers: C. S. Goddard & Son, first, $2; Mrs. F. Hoyt, second, $1.

Collection of Floral Designs: Miss G. P. Sanborn, gratuity, $5.

Exhibition of Greenhouse plants: C. S. Goddard & Son, first, $20; Miss G. P. Sanborn, second, $15; W. G. Bailey, Freeport, third, $10.

Exhibition of pot plants: Lucy A. Chandler, first, $10; Mrs. Anthony Cummings, second, $8.

Exhibition of Ferns: C. S. Goddard & Son, first, $3; W. G. Bailey, second, $2.

Exhibition of Geraniums: Mrs. A. Cummings, first, $2; W. G. Bailey, second, $1.

Exhibition of Foliage Begonias: W. G. Bailey, first, $2; Mrs. B. T. Townsend, second, $1.

Exhibition Tuberous Begonias: W. G. Bailey, first, $2; Mrs. B. T. Townsend, second, $1.

Exhibition of Coleus: Mrs. B. T. Townsend, first, $2; W. G. Bailey, second, $1.

Exhibition of Gloxinias: Mrs. B. T. Townsend, first, $2; Mrs. C. E. Waterman, second, $1.

Double Geranium: Mrs. A. Cummings, first, 50c.

Single Geranium: Mrs. A. Cummings, second, 25c.

Foliage Begonia: Mrs. A. Cummings, first, 50c; W. G. Bailey, second, 25c.

Flowering Begonia: Mrs. B. T. Townsend, first, 50c; W. G. Bailey, second, 25c.

Tuberous Begonia: W. G. Bailey, first, 50c; Mrs. B. T. Townsend, second, 25c.

Coleus: Mrs. B. T. Townsend, first, 50c; Mrs. C. E. Waterman, second, 25c.

Fuchsia: Mrs. A. Cummings, first, 50c; Mrs. E. Klusener, second, 25c.

Carnation: W. G. Bailey, first, 50c.

Ever-blooming Rose: Mrs. A. Cummings, first, $1.

Single Pot plant: Mrs. B. T. Townsend, first, $2; Mrs. A. Cummings, second, $1.

Climbing plant: Mrs. A. Cummings, second, $1.

Pair Lawn Vases (filled): Mrs. A. Cummings, first, $3.

Cut Wild Flowers: Mrs. C. E Waterman, first, $3.

Pressed Wild Flowers: Edith M. Stoddard, Belfast, first, $5; Lillian A. Spratt, Kenduskeag, second, $3; F. L. Varney, East Lowell, third, $2.

WINDOW GARDEN DEPARTMENT.

Geraniums. First Premiums: Ethel Drake, Lora Bearce, Fred Greenleaf, Harry Prince, Angie Welch, Clinton Bailey, Gertrude Stetson, Belle Jordan, Sadie Tracey, Amy Cushman, Gladys Lothrop, George Bower, Lester Brett, Elwin Nutter, Auburn; Rosa Buckfield, Ethel Hunt, Edith Davis, Belle Bushby, Arthur Handy, John O'Brien, Bennie Armone, Goldie Ware, Alice Cartland, Ethel Lewis, Lewiston, 30 cents each.

Second Premiums: Walter Hunt, Forest Atwood, Maude Preble, Charlie Woodbury, James Gould, Wallace Philoon, Vargie Pulsifer, Harold Furbush, Wallace Clement, Maud Stearns, Everett Davis, Carl Currier, Lizzie Briggs, Paul Preble, Helen Sprague, Della Brabson, Vertie Edwards, Ralph Chase, Grace Bowen, Auburn; May Joyce, Fred Nandtke, Eugene Boucher, James Daly, Alvin Riley, Willie Nason, Ray Smith, Lewiston, 20 cents each.

Coleus. First premiums: Guy Mixer, Lin Smith, Ethel Storah, Maude Larrabee, Lilla Stetson, Chester Kilgore, Arthur Decker, Auburn; Lewis Noland, Mary Cotton, Nellie Durgin, Frank Crowley, Lewiston, 30 cents each.

Second premiums: Adelbert Morse, Florence Palmer, Annie Brabson, Mabel Coombs, Ernest Lord, Lula Yeaton, Allie Garcelon, Goldie Miller, Ruby Randall, Auburn; George Robinson, Arthur Thompson, Harry Lunt, Fannie Love, Lewiston, 20 cents each.

SUMMARY OF AWARDS.

Apples—General exhibitions..............	$219 50	
Specials........................	61 00	
Single plates....................	90 00	
		$370 50
Pears—General exhibitions and single plates........		64 25
Grapes..		9 00
Plums		35 50
Fruits in glass, etc.................................		4 00
Canned fruits.....................................		40 50
Plants and Flowers—Cut Flowers.........	$57 00	
Floral Work..........	41 00	
Plants	96 50	
		194 50
Specials—Wild Flowers..................	$13 00	
Children's Plants...............	16 20	29 20
Total		$747 45

LIST OF PREMIUMS AWARDED AT THE WINTER MEETING, HELD IN FOXCROFT, JANUARY 8th and 9th, 1895.

Collection Apples: B. H. Ridley, Jay, $5; G. K. Staples, Temple, $4; O. L. Larrabee, West Levant, $3; S. R. Sweetser, Cumberland Center, gratuity, $3.

Best Plate American Golden Russets: Charles H. Judkins, Chesterville, $1; B. H. Ridley, Jay, 50c.

Baldwin: J. W. True, New Gloucester, $1; Chas. S. Pope, Manchester, 50c.

Ben Davis: J. W. True, New Gloucester, $1; B. H. Ridley, Jay, 50c.

Fallawater: O. L. Larrabee, West Levant, 50c; H. L. Leland, East Sangerville, 25c.

Fall Harvey: B. H. Ridley, Jay, 50c; H. L. Leland, East Sangerville, 25c.

Fameuse: B. H. Ridley, Jay, 50c; H. L. Leland, East Sangerville, 25c.

Hubbardston Nonsuch: Chas. S. Pope, Manchester, $1; Wm. R. Wharf, Gardiner, 50c.

Jewett's Fine Red: D. H. Knowlton, Farmington, 50c; J. W. True, New Gloucester, 25c.

Milding: H. L. Leland, East Sangerville, $1; G. K. Staples, Temple, 50c.

Mother: Wm. R. Wharf, Gardiner, $1.

Northern Spy: C. H. Judkins, Chesterville, $1; L. A. Rouse, Farmingdale, 50c.

Pound Sweet: J. W. True, New Gloucester, $1; B. H. Ridley, Jay, 50c.

Rhode Island Greening: E. W. Dunbar, Damariscotta, $1; S. R. Sweetser, Cumberland Centre, 50c.

Rolfe: O. L. Larrabee, West Levant, $1.

Roxbury Russets: Charles S. Pope, Manchester, $1; H. L. Leland, East Sangerville, 50c.

Starkey: Charles S. Pope, Manchester, $1; H. L. Leland, East Sangerville, 50c.

Stark: A. A. Eastman, Dexter, 50c; J. W. True, New Gloucester, 25c.

Talman's Sweet: Charles S. Pope, Manchester, $1; C. H. Judkins, Chesterville, 50c.

Tompkin's King: G. K. Staples, Temple, $1; William R. Wharf, Gardiner, 50c.

Wagener: B. H. Ridley, Jay, 50c; O. L. Larrabee, West Levant, 25c.

Wealthy: S. R. Sweetser, Cumberland Centre, $1.

Yellow Bellflower: A. E. Andrews, Gardiner, $1; William R. Wharf, Gardiner, 50c.

Winter Pears: D. P. True, Leeds Centre, $1.

Lawrence Pear: D. P. True, Leeds Centre, $1.

Vicar of Wakefield: D. P. True, $1.

Keifer: D. P. True, $1.

Canned Apples: Charles E. Wheeler, Chesterville, $2.

Winter Nelis Pear: Charles S. Pope, Manchester, $1.

Beurre Clairgeau: D. P. True, $1.

We notice some very nice small fruits put up in small bottles by W. W. Crooker of Monson; also four glass jars of gooseberries, currants and raspberries, put up by A. R. Dodge of Dexter; for all of which your committee would recommend a gratuity.

The committee add in closing their report:

We also notice some quinces exhibited by D. P. True, Leeds Centre, that are well grown and nicely preserved, and worthy of a gratuity.

Business Transactions at the Annual Meeting.

September 6, 1894. The members of the Society met in the hall provided for the purpose on the Fair grounds, in Lewiston, at 6.30 P. M. Proceeded to the election of officers for 1895. [See page 9.]

Professor Munson stated that legislation referring to the extermination of black knot seems to be inexpedient at the present time, and the committee was accordingly granted time to prepare a final report for the Winter Meeting.

AT THE WINTER MEETING JANUARY 8TH AND 9TH, 1895.

By invitation of Mr. H. L. Leland in behalf of local organizations and citizens of Piscataquis county the annual Winter Meeting was held in Opera House, Foxcroft, January 8th and 9th, 1895. Secretary McKeen joined with the Society and the meeting was held with the most cordial good will and approval of all concerned.

The meeting was called to order at the appointed hour by the President, and the Treasurer and Secretary presented their annual reports. [See preceding pages.]

The Committee on Legislation appointed at the last Winter Meeting reported as follows:

After a thorough canvass of the subject your committee deem it unwise at present to urge legislative action looking toward the suppression of the "black knot" of plum and cherry trees. It is found that trees apparently free from disease may be infected from diseased trees at least three-fourths of a mile distant. As the culture of plums is comparatively a small industry, while the wild plum and cherry trees of our forests are an ever present menace it is doubtful if any law could prove effective. Public sentiment is not yet sufficiently strong to insure the enforcement of such measures as would be necessary.

It therefore remains for each grower to continue the fight single handed and for this society to continually agitate the question of how to deal with plant diseases. It now seems probable that black knot may be held in check by the timely use of Bordeaux mixture. If this be the case, the progressive grower will have a more valuable aid than a mere statute which from the nature of existing conditions must be inoperative.

W. M. Munson,
W. A. Luce,
S. H. Dawes,
Committee.

Committees on exhibition of fruits, consisting of S. H. Dawes and J. F Norris, was appointed by the President. [See page 14 for report of premiums awarded]

Committee on Resolutions, consisting of Charles S. Pope, W. M. Munson, and B. H. Ridley, was appointed, and before the close of the meeting reported as follows:

Resolved, That the Maine Pomological Society fully appreciates the cordial welcome extended by the citizens of Dover and Foxcroft, and the assistance rendered in making the program of interest.

Resolved, That the thanks of the society are due to the hotels of the two villages and to the railroads for the reduced rates given.

A special committee was appointed to consider and report on the recommendations contained in the President's address. The following gentlemen composed the committee: Charles S. Pope, Dr. H. A. Robinson and A. A. Eastman. [See page 50.]

The following resolution was presented by the Secretary and unanimously passed:

Whereas, We recognize that fruit growing is one of the most important industries of agriculture in the State; and whereas we believe that the various agricultural societies in the State should do more to develop this particular industry by offering more liberal premiums for exhibitions of fruit; therefore,

Resolved, That we recommend for the consideration of the societies the propriety of a premium of at least five dollars for the best exhibition of correctly named varieties of apples, the collection to consist of at least fifteen varieties; that premiums of at least fifty cents per plate of five specimens be offered for the following named varieties, or as many of them as possible:

Alexander, Golden Russet, Ben Davis, Deane, Duchess of Oldenburg, Fallawater, Fall Harvey, Fameuse, Garden Royal, Granite Beauty, Jewett's Fine Red, King Sweeting, Large Yellow Bough, McIntosh Red, Milding, Munson Sweet, Peck's Pleasant, Porter, Pound Sweet, Primate, Pumpkin Sweet, Rolfe, Somerset, Stark, Starkey, Wagener, Wealthy, William's Favorite, Winthrop Greening, Yellow Transparent, Baldwin, Gravenstein, Hubbardston Nonsuch, Northern Spy, Rhode Island Greening, Roxbury Russet, Talman's Sweet, Tompkins King, Yellow Bellflower.

The Pomological Society has very largely increased the size of its exhibition by offering less premiums for single plates of other correctly named varieties in addition to the list given.

The object of these recommendations is in no way an effort to dictate to any of the societies, but rather to urge upon them the importance of giving the fruit industry of the State the prominence its magnitude entitles it to receive.

Voted, That the foregoing resolution be given a passage, and respectfully referred to the Board of Agriculture for its consideration.

A copy of this resolution was sent to the State Board of Agriculture and the following note was passed by that body:

ENDORSED BY THE STATE BOARD OF AGRICULTURE.

This resolution was read and a vote taken, that the Board endorse the resolution of the Pomological Society as passed at its meeting at Foxcroft, January 8th and 9th, 1895.

Attest:

A. R. SMILEY, *Clerk*.

B. WALKER McKEEN,
Secretary State Board of Agriculture.

Later in circular form the above was sent to each agricultural society in the State.

MEETINGS OF EXECUTIVE COMMITTEE.

March 16, 1894. Met at Elm House, Auburn.

Voted, To adopt a scale of points for judging single plates of apples and pears, no plate to receive a first premium that scores less than 75 per cent; a second that scores less than 60, and a third that scores less than 50.

The schedule of premiums was revised for the next annual exhibition.

April 13th. The Secretary received from the Secretary of the Maine State Agricultural Society a copy of vote passed by the trustees of that Society, arranging terms of exhibition.

This vote as agreed upon is as follows:

Voted, To accept proposition from State Pomological Society for joint exhibition for 1894. The State Agricultural Society to pay the Pomological Society $500 on condition that the pomological premiums shall not be reduced from last year; the State Society to furnish two policemen the last day if requested; to issue two single admission tickets to annual and the usual ticket to life members, not members of the State Society; also to furnish single admission to children only who furnish plants, and that the trustees shall determine the amount of alterations in tables for which they will be responsible.

August 21. Meeting called in Lewiston to arrange for exhibition. Visited the exhibition building and agreed upon such changes as seemed best and instructed Messrs. Andrews and the Secretary to carry the same into effect.

November 8. Meeting held at the Barden House, Phillips.

The Secretary presented schedule of premiums awarded at the exhibition and the Treasurer was authorized to hire money to pay the same so far as it may be necessary.

Voted, To accept the invitation offered in behalf of the citizens of Piscataquis county, to hold the meeting at some accessible point there; that the time and place of holding the meeting be referred to the President and Secretary.

Voted, That premiums be offered at the Winter Meeting, not to exceed those of last year, and that the Secretary be instructed to prepare the schedule.

January 9, 1895. Meeting of committee in Foxcroft following the Annual Winter Meeting.

Voted, That the President and Mr. Andrews visit Augusta and take such action to secure the deficiency, the past two years as their judgment may determine.

PUBLIC MEETINGS

OF THE

Maine State Pomological Society.

PAPERS, DISCUSSIONS, Etc.

ANNUAL MEETING,

Lewiston, September 6, 1894.

Special Meeting, Conducted by the Executive Committee.

Phillips, November 8, 1894.

UNION WINTER MEETING,

Foxcroft, January 8 and 9, 1895.

PUBLIC MEETINGS.

PROGRAMMES.

ANNUAL MEETING DURING THE EXHIBITION.

Music, conducted by A. R. Smiley.
Election of officers.
Address by Mrs. Alonzo Towle, Freedom, N. H.,
"Inside the Hedge Row."

SPECIAL MEETING, PHILLIPS.

Apples: Their Culture, Handling and Marketing,
Conducted by President Pope.

Paper, John W. True, New Gloucester.
The Enemies of Fruit, A short talk by Prof. W. M. Munson.
Discussion, Small Fruits and Their Culture.

The subject will be opened by President Pope, and followed up by the Secretary of the Society and others.

Fruit growers were invited to bring in specimens of fruit grown in North Franklin.

UNION WINTER MEETING AT FOXCROFT, JAN. 8 AND 9, 1895.

TUESDAY, 10 A. M. BUSINESS MEETING.

Report of Treasurer.
Report of Secretary.
Other Business.

AFTERNOON.

Address of Welcome, H. A. Robinson, D. D. S., Foxcroft.
Response.
President's Annual Address, John W. True, New Gloucester.
The Young Orchard, Chas. E. Wheeler, Chesterville.

EVENING.

Enemies of Fruit Culture and How to Subdue Them,
Prof. W. M. Munson, Orono.

Cultivation of Orchard and Small Fruits,
O. B. Hadwen, Worcester, Mass.

WEDNESDAY, A. M.

Progress of Orcharding and Fruit Culture in Piscataquis County,
Calvin Chamberlain, Foxcroft.

Discussion—Condition and Prospects of Fruit Culture in Piscataquis County, H. L. Leland, E. Sangerville.

The Home Garden, Chas. S. Pope, Manchester.

AFTERNOON.

A Discussion as to what shall be Maine's Flower in the National Garland, Janet L. Dingley, Auburn.
State Chairman of the Maine Floral Emblem Society.

After the discussion there will be a ballot for the flower preferred.

Study of Plant Life, Superintendent John R. Dunton, Rockland.

EVENING.

Good Food from the Garden,
Miss Anna Barrows, School of Domestic Science, Boston.

FRUIT EXHIBITION.

There will be an exhibition of fruit, to which all fruit growers in the State are cordially invited to contribute.

EXHIBITION RULES.

1. The same general rules will govern this exhibition as the other exhibitions of the Society.

2. All entries must be made with the Secretary on or before 1 o'clock of the first day (January 8), and the fruit must be in place by that hour.

3. Five specimens of apples or pears will constitute a plate. Exhibitors will please take notice.

4. The Society's premiums are open for competition to all persons residing in the State; but when premiums or gratuities exceeding $1.00 and less than $20.00 are awarded to a person not a member of this Society, a fee of $1.00 will be deducted therefrom; and when premiums and gratuities amounting to $20.00 or more are awarded to a person not a life member of this Society, the fee for life membership will be deducted therefrom, and a certificate of membership will be issued accordingly.

PAPERS, DISCUSSIONS, ETC.,

AT THE STATE FAIR MEETING.

The address by Mrs. Alonzo Towle of Freedom, N. H.,—"Inside the Hedge Row"—was an eloquent appeal for flowers in the home garden. She urged the planting of them, described them, and gave cultural directions of value to all interested in flowers. She illustrated her lecture from her own experience in the care of flowers.

Excellent music was furnished under the direction of Mr. A. R. Smiley.

AT THE PHILLIPS MEETING.

APPLES—THEIR CULTURE, HANDLING AND MARKETING.

President Pope with a few appropriate words introduced the subject of the afternoon, and briefly called attention to some of the essentials of successful fruit culture in Maine. He then introduced Mr. John W. True of New Gloucester, who read the following paper:

In order to raise good apples and do it successfully some one has got to begin with the young trees and have them properly set and cared for, a number of years at least, and any one not having a taste for that kind of labor should never attempt it, for if he does, failure is sure to follow; but any one with a love for the work and a real interest in it, one that can truly enjoy working around the young trees, seeing them grow and form their tops, can raise apples and harvest them; but that is not the money in his pocket. He has then got to market them and it is all too true that many of us fruit growers and farmers are very poor market-men. In order to be a good market-man, one has got to follow the market reports, keep himself posted as to the supply of and demand for the article he is producing, in order to get the most for his labor and skill in his particular line of work.

If he does not do this it is equal to a tax on what he has produced. After a fine crop of apples has been grown it is of the first importance that they should be well marketed. Now one of the greatest questions of the day is how shall that be done? It is now the fashion to sell them to some shipper "*right through*" and he takes them all and packs them himself, in that way the fruit grower gets rid of all his apples, at a low price to be sure, but he gets them all marketed. A large fruit grower told me within a week that he had shipped the last of his apples, 810 barrels, and the packers took practically *all* of them. It would seem to a disinterested party that that sort of business would, in the end, react on the producer a few years later; next year or a little later our apples will not stand quite as high in the markets of the world and consequently shippers cannot pay quite as much for them and we shall be obliged to take a little less for them.

Now it is one of the easiest things in the world for a person to find fault, tear down and pick methods and systems into pieces, but not so easy a matter to substitute something better for the old, institute reforms that are an improvement. But it would really seem as though the growers of large quantities of apples could do better, get more money out of the business, if they would put a little more time and business tact into them, by packing them themselves, doing it well and honestly, and then put their own name and residence on every package. In that way, in time, consumers would find out who raised and packed good apples, and there would be a call for good fruit, well packed, at an advanced price.

As the business is now conducted it is the "barrel" the world over, prices all over the world are quoted by the "*barrel.*" One of the questions that is being asked many times over is this: Is the barrel the best thing to pack apples in, and if it cannot be shown that there is more money in packing them in some other way then it will remain barrels to the end of the chapter. In favor of the barrel we can say that it makes one of the *strongest* packages there is, it is also one of the easiest handled and where second-hand ones can be bought it is one of the cheapest, but the question is being agitated as to boxes being used, some growers, if I am rightly informed, in this State are using boxes this year. If boxes are to be used it would seem as though some care should be used to have them of some standard size, that is, when we see quotations of apples by the box, we should know what kind of a box is referred to.

A number of articles have appeared in the papers quite recently advocating boxes or cases for apples, one of the recommendations is for a box "with two compartments one foot square each (inside measurement)" for "*table apples*" each apple to be wrapped in paper. And there is no doubt but what it would pay to take that amount of care with our nice, high colored fruit, for they are better than oranges and I have no doubt would bring a higher price if the same care was taken with them. If such cases were used, the grower would then feel as though he would like to have his name go upon each package. The same writer also recommends a case for shipping apples with two compartments each to be fifteen and one-half inches square which would hold about the same quantity as a barrel, the case to be made of one-half inch boards for top, bottom and sides, and inch boards for ends and division in the center, but such a box I am convinced would be too large and expensive to handle. It would seem as though there ought to be a call for a package holding about a bushel or one-third of a barrel, the box to go with the apples, such a box is already made for canned goods called a three pound box, very neat, and costing about ten cents.

We know that apples that go into our retail stores by the barrel and then are measured out and sent to the consumer get very much bruised and half spoiled, when if the customer could buy a box and the box go with the apples he could well afford to pay the extra expense for the package. On making inquiry I also find that the box with two compartments one foot square inside measurement is more expensive than one of some other shape. We have had one made as a sample that is practically the same size, each compartment measuring nine inches wide, ten and three-quarters deep, and eighteen inches long, this box will hold one-half barrel and is in our opinion as heavy as it is practical to handle well, we would like to hear this question discussed in all its bearings, that we may perhaps learn a better way, a way that will give the producer a better return for his labor.

Prof. W. M. Munson of the State College made a short talk on the "Enemies of Fruit." The same subject was taken up more at length at the Annual Meeting and the paper may be found in subsequent pages of the Transactions.

SMALL FRUITS AND THEIR CULTURE.

President Pope gave an account of his experience in growing strawberries. A few years ago he did not believe it would pay him to attempt to grow strawberries, but after attending a good many meetings of the Society he was persuaded to try it for a year or two. He selected a piece of moist, rich land where he could make a few long rows, so as to easily cultivate them with a horse. The first crop satisfied him that he could not afford to buy berries for his family when he could so easily raise all he wanted at slight cost. The horse does a large part of the work. He has not been without a bed of strawberries since. The plants need frequent cultivation and some cutting back of runners. Spring is the best time to set the plants, and in the fall just before the ground freezes he mulches lightly with strawy horse manure. He has successfully raised several varieties. The Crescent Seedling and Charles Downing grow well together. The Bubach is a good grower with him, but he does not like it so well as some of the other varieties. He assured his hearers that any who wished could raise strawberries, but he urged them not to be afraid of getting the soil too rich or hoeing the ground too often. "You can raise these berries much cheaper than you can buy them, and you will not do without them after you have raised them a single year."

Secretary Knowlton followed with a talk on growing raspberries, blackberries, currants and gooseberries. Nothing seemed so nice in his family as an abundance of good fruit. As the season opens with the strawberry we are often led to the belief that this is by far the best of the small fruits. It is good and much enjoyed, but he believed it could not take the place of the raspberry or the blackberry. As a fresh fruit for dessert it is the best, though the finest supper he ever ate consisted of luscious blackberries and nice bread with a cup of tea. In other words each of the small fruits has its place and we seem to want one about as much as another, while for canning and cooking the raspberry and blackberry are certainly superior to the strawberry.

Any good corn land is good enough for these fruits. The plants for convenience should be set in rows—raspberries two feet and a half and blackberries three feet apart. The rows of the former should be at least five feet apart and of the latter six or seven. The cap varieties of raspberries should be set in rows at least seven feet apart.

The suckers form in the fall and are ready to push up through the soil early in the spring. For this reason it is much better to set the plants in the fall, from the middle of September to the middle of October. In setting cut the canes back to a foot in length or even less. The Cap varieties do better when set in the spring. The ground about them should be frequently cultivated, and only three or four of the new suckers should be allowed to grow. When the canes are about three feet high pinch off the terminal bud. This is the point where the most failures come in raising raspberries and blackberries. Permit not more than four or five canes to grow and then pinch them back. In the fall or early in the spring the growth of the previous year can be cut out and taken away. Bone meal and wood ashes make the best fertilizer, but "I have never seen a place too rich for these fruits if the rules for thinning out and pinching back are only followed."

The Cuthbert is the most popular market variety, though it is not so hardy and it will kill down occasionally, but the fruit is large and very handsome. The Turner is hardy but more like the natives. The fruit is smaller but the flavor is better. It will often bear when the Cuthbert has been winter-killed and is a little earlier. The Golden Queen is a seedling of the Cuthbert with similar habits of growth and general appearance. Of blackberries there are only two kinds which can be recommended. These are Snyder and Agawam Both are hardy, the latter a little sweeter but more likely to have a bitter flavor.

Currants and gooseberries need the old wood trimmed out frequently, but enjoy a rich, moist soil. The old fashioned currant is one of the best in flavor though it is very much smaller than some of the newer sorts. Fay's Prolific is a large fruited kind and is regarded as one of the best, while the White Grape is the best white kind.

Of gooseberries the Houghton is very much like the wild gooseberry in its habits but it is much larger and of better quality.

Most growers prefer the Downing, whose fruit is larger and if anything better. These are American varieties and entirely free from mildew. There are several new varieties but as yet not enough is known of them to speak with certainty, though they are easily raised and mildew does not trouble them. The Industry is one of these. A good English variety is the White Smith. It mildews somewhat, but when sprayed with the Bordeaux mixtures, it is free from it. The fruit is large and of excellent quality.

Tables were placed in the hall, and these were well covered with specimens of fruit grown in North Franklin. It was a surprise and pleasure to some of the committee to observe the high color and perfection of the fruit. In closing his remarks the Secretary thanked the people in behalf of the Society for bringing out so excellent an exhibition of fruit, and for the many courtesies that had been extended to the officers in connec ion with the meeting.

AT THE WINTER MEETING.

ADDRESS OF WELCOME.

By Dr. H. A. Robinson.

Mr. President, Members of the Maine State Pomological Society and Board of Agriculture:

In response to the request of your Secretary and as a life member of this Society from its present organization, it becomes my duty and is also a very pleasant privilege to welcome the Society to a meeting in Piscataquis county. Although we claim the pivotal point or geographical center of the State to be within our borders, and very near where we are now assembled, we have been and are to a great extent somewhat isolated or to one side of the great fruit growing portion of the State lying to the southwestward of us. So, therefore, we have not been situated to conveniently take an active part in the meetings and exhibitions of the Society; and we feel that it is very kind and generous of you to come so far from the more convenient center of your membership to a meeting here.

We are on about the same line of latitude and the same isotherm as Moscow and Jerusalem, in the western part of this State. Here, north of the long and high range of Charleston and Garland hills that form the southern boundary of this county, we have almost another climate from what you have who live south of that line. Here the Baldwin and some other varieties of apples are tender and liable in occasional severe winters to be injured. Pear trees when set out hardly know whether it is worth while to try to live or not, and if they do survive and grow it is in a rather feeble, half-hearted way. The wood is stained by the severity of winter, wounds heal with difficulty, and the fruitage is comparatively small. Occasionally, however, some do fairly well and give encouragement to continue trying. With grapes, only the very earliest varieties ripen.

But nevertheless, this is the birthplace of the noble Rolfe apple, and we raise apples in abundance for home use and some to ship, and we might raise an abundance of small fruits if we only would. As an example of what may be done and for the encouragement of others, I can say that strawberries have been raised here at the rate of three hundred dollars per acre, and onions at a value of five hundred dollars per acre in quarter acre lots. Currants may be profitably raised here. A Fay's Prolific currant bush, consisting of a single twig, brought here eleven years ago, has by judicious propagation been increased a thousand fold; and the sale of bushes and fruit has brought scores of dollars, besides being a benefit to the community at large, as is the introduction of any superior new fruit. If this can be done by an amateur, of course those who make a regular business of such things can do better.

It often requires no more labor to do things the right way and succeed, than the wrong way and fail. Hard work without proper knowledge is not usually successful, and hard work without proper management will meet with equal failure; but the right thing done at the right time and in the right manner is successful.

People could if they only would, and it is one of the objects of this society to encourage this very thing; to help awaken an interest in, and spread abroad a knowledge of the "know how," which is so very essential to the success of any undertaking.

This society exists for the acquisition and diffusion of knowledge; and we hope and expect as knowledge is cumulative, that those who succeed us will be benefited by the results we attain, and will know more than we do. In this direction there is one thing which is very creditable to the fathers and mothers of New England, and in which they are nearly all agreed; and that is, they all want their children to have a better education and a better chance in the world, if possible, than they themselves have had. But too often they overlook one of the greatest factors in gaining the desired end, and that is home influence, training and instruction. Permit me a few words here in reference to the home life that has so much to do with the formation of habits for life, the moulding of character, and the success that comes from knowledge.

The child has everything to learn, and it is the privilege of the parent to be its first teacher. Have the dictionary, the cyclopedia, the atlas, and such other works of reference as you can afford, handy, and put them to daily use. Encourage the children to ask questions, and be patient in answering them. Live your school days over again in the discussion of their lessons, to your mutual advantage. Find out with them the pronunciation, spelling and meaning of the doubtful word. Hunt up the location of the place about which you have been reading, and find out all about it. Talk over and discuss with them the great events of the world at large that you read of daily, and join the results of your reading, observation and experience to the advantages of the improved methods of the schools of the present day. Encourage in them habits of carefulness, thoughtfulness, and thoroughness, of order, method and punctuality. Tell them that a high school or academic education in additon to a knowledge of the three "R's" is not to enable them to live by their wits, but to fit them to do more intelligently and efficiently some part of the world's work. The mind is educated that it may the better direct the work of the hands. Try to know a little more of something every night than you did in the morning. This in one direction is one of the right ways of right living, and as every year adds to your stock of knowledge, so every year should increase your love of its acquirement.

Children should be instructed by their parents in the great problems of nature. They have a right to know of things and to know of them in the right way. To illustrate, take a field in which you, as horticulturists, are familiar. Tell them of the duality of all living things in nature. Begin by showing the flower of the meek and lowly strawberry plant; show the structure of the flower; point out the pistils and stamens; explain to them that unless the pistils are fertilized by the pollen of the stamens no fruit and seeds will result; and if stamens do not exist in the same flower with the pistils, as is sometimes the case, another kind which has stamens in its flowers must be planted alongside that by means of wafting by winds and the visits of insects the pollen may be carried and fruitfulness result. That a like condition exists to some extent with some kinds of grape vines and pear trees. That the pollen from the tassle of the corn must fall upon the silk, each individual thread of which connects with what will become a kernel of corn in order that the perfect ear result. That this condition of things exists throughout animate nature with plants and animals. Their minds will then be prepared to understand the sexuality of the animal kingdom in a perfectly natural and logical manner without a thought or the suggestion of a thought of indelicacy. Simple as this is an important truth has been unfolded, an important lesson learned, and in the right way.

Of course you will not fail to inculcate a spirit of that "greatest thing in the world," of which Prof. Henry Drummond writes so graphically, and which distinguishes the humane man of the present, and the still more humane man, we hope, of the future, from the savage type from which he has sprung. Knowledge is second only to "the greatest thing in the world." It has been said "knowledge is power." Let me add, in the pursuit of knowledge is happiness.

Education is of necessity partial and comparative, the ocean of knowledge is so vast. A person may be learned in one thing and unlearned in another. Some one has aptly said, "One should know something of everything, and everything of something." That is, he should have some knowledge of all things, but a thorough, exhaustive knowledge of whatever he makes his life work or business.

You come to us amid the snows and inclemencies of winter. We wish it could be at some other season of the year, and that you could view some of the scenery that nature has given us here. For who ever knew a person with a natural love of fruits and fruit growing in his heart to be indifferent to the beauties of nature?

This county is the favored location of some of the great scenic features of the State. Its great lake. with its wonderful Mount Kineo, forms a portion of its western boundary. Its highest mountain, Katahdin, stands in majesty on its eastern border midway up the line. Its greatest river, Penobscot, rolls its flood of water across the county, and curiously enough passes by within only two miles and forty-seven rods of the upper end of Moosehead lake. Beautiful Lake Sebec, with its unique mountain background, the most central body of water in the State, is within an hour's drive of these villages. We wish you could come here in beautiful October, and ride northward on the railroad through the towns of Abbot, Blanchard and Shirley, to Greenville. You would find scenery beautiful to behold. Then take the Canadian Pacific Railroad at the latter place and go eastward across the county, skirting the rugged and precipitous southern side of Boarstone mountain, crossing the enormous iron trestles of Wilson and Onawa, looking down into the tree tops of hundreds of acres of variegated forest and over the waters of placid lakelets, go on to Henderson junction in the town of Brownville, and up to the ore mountain and Silver lake at Katahdin Iron Works. Into Silver lake flows a rapid stream called the Gulf stream, with its tributary called the Gulch, which runs through miles of true canon, said to be one of the finest examples of real canon, on a moderate scale, this side of the Rocky mountains.

This county, after losing sixty townships to Aroostook in 1844, is seven townships wide and sixteen townships long, or 3,780 square miles in area. It would make a whole state like Delaware, another the size of Rhode Island, and have townships enough left to make an ordinary sized county as counties average. Only about twenty townships, however, of this great area is settled, the rest is wilderness. These are some of the physical features of our county you would enjoy seeing in October, which month is also, in this region, the month for gathering and storing the apple, and brings us back to the primary object of this meeting.

Fruit growing is a pleasant and remunerative business, and the use of a succession of fruits in the family is not only agreeable but decidedly beneficial and healthful.

Only exceeded by the pleasure derived from the actual work in caring for the trees of the apple orchard, is that to be had in viewing the fruition of that labor at the exhibitions of the fruit itself, when the long tables are covered with red, yellow and multicolored apples.

I have visited exhibitions of fruit of the American Pomological Society at Boston and at Philadelphia, and World's Fairs at Philadelphia and Chicago, but I have never seen finer displays of apples than I have seen in years past at the exhibitions of this Society.

I want to congratulate the Society on having attained its majority. It has safely passed the perils of infancy and youth, the often awkward and sometimes erratic period of adolescence and may now continue its good work with the conscious vigor of young manhood. You are now twenty-one years old.

You will doubtless still continue to receive the fostering care and aid of the State—a State of which we are all proud, and have reason to be, and which now contains 700,000 of as well-governed, law-abiding, thrifty, prosperous and happy people as the sun shines on.

I believe that this Society and its co-laborer, the Board of Agriculture, are in the way of being very helpful to the cause of fruit growing and farming in this State, and in the name of the people of these twin-villages and in behalf of our three agricultural Societies, Eastern, Western and Central, I extend to you a cordial welcome to this county, hoping that the leaven of your enthusiasm may be an excitant to our comparative luke-warmness and indifference.

The response to the address of welcome was given by Secretary Knowlton, who briefly gave an outline of the work being done by the Society, and in behalf of the visitors present, thanked the speaker for his cordial welcome, expressing in closing the hope tha the present meeting might prove the most profitable ever held by the Society.

THE PRESIDENT'S ANNUAL ADDRESS.

By JOHN W. TRUE of New Gloucester.

Ladies and Gentlemen:

Another year has rolled round since our last winter meeting, and the tenth anniversary of my first meeting with the Maine State Pomological Society has arrived. I little thought, then. that such an interest would be created in this subject of "Fruit Culture" as to induce me to attend every meeting of the Society for the next ten years. And I can see that the knowledge and interest which I have gained has shown itself in my surroundings. I feel that this is one of the missions of this society to awaken interest, as well as to teach the people of this good old State of Maine the art of raising more and better fruit, and to surround their homes with more of the beauties of nature, in the way of plants and flowers, as well as the luxuries in the form of an abundance of the small fruits for family use. And that brings us to the question, how can we increase our membership? Every member that is added to our society is, to a certain extent, an example to others in his neighborhood, as it is almost sure to result in better practices, pleasanter surroundings, and a happier home. This question has been called up before, but we wish it might have careful consideration, and see if some inducement cannot be held out to the fruit growers and farmers throughout the State to become members of our society, and surely by gaining members we should gain some strength. Let us all take a hand in this, and see if we cannot bring it to pass.

We would like to call attention to the fact that at all our meetings and exhibitions a goodly number of farmers and fruit growers are anxious to learn the name of some variety of apples, pears or plums. Quite often some one has been on hand who was well fitted to give the desired information, and they have always been kept busy during their stay with us. It would seem to us that the subject calls for more attention, and that funds should be appropriated, to have some good authority on all the fruits in which we are interested in attendance at all our exhibitions and meetings where fruit is displayed. I apprehend that our exhibition in the line of plums is to increase wonderfully within the next ten years, and with the best of care the naming of them will be very much mixed and uncertain; so that it will require a man that is fully up with the times in all the lines of fruit culture. The services of such a person will cost something, but I think it would give great satisfaction, not only to our exhibitors and members, but to many of our visitors who come to look over our exhibition, bringing with them an apple or a pear for a name.

The increase of our State stipend that was asked for from our last legislature, and cheerfully granted, but got "side-tracked" before it got through the tortuous road all bills are obliged to travel to get fully through our lawmakers' hands, should be carefully looked after some time during the present session, and see if we cannot get what it was voted for this society to have for the past two years. You will see by the last report of our Treasurer that the sum of $420.27 was due the permanent fund—in other words, that amount has been drawn or borrowed from the fund. I wish to urge a discussion of that subject upon our members present at this meeting, to see if some way cannot be devised to restore this amount to the permanent fund.

The "small fruit" industry has taken on such proportions, both for the family and for market, that with our increased funds I should like to see our executive committee hold a meeting the first of July, at some point where this branch of farming receives a good degree of attention, and offer a short list of premiums for strawberries, and at the same time have a good speaker present, thoroughly informed on the subject, and as time goes on I would like to see other days set apart for other fruits, but we must be content with one thing at a time.

I would like to call attention to one of the many points for which our retiring President has labored, and that is to continually press upon the attention of all fruit growers and farmers the fact that they cannot afford to buy their stock of plants and trees of irresponsible traveling tree peddlers. If you want but few trees or plants, find others that would like a few and put your orders together, send to some reliable dealer for prices, then forward the money—it will not take half so much—and you will get stock true to name and of good quality. Do not let the peddler who knows absolutely nothing about fruit growing tell you what you want and persuade you to buy it, unless you have money to give away, and you want to give it to this particular person, and in that case I would recommend that you give him the money and let him keep the stock, as I am persuaded that you will get more satisfaction, in the end, out of the transaction. Especially will that be the case, I am afraid, with the comparatively new Japan plums, where the utmost care must be taken, or confusion in names and loss by worthless varieties will be the result.

The subject of spraying, which has engaged the attention of some of our fruit growers for the past two or three years, is becoming a necessity for all those who propose to make apple growing profitable, as the "apple scab" has apparently come to stay, and its destructive propensity has shown itself to a greater extent the past year than ever before and the importance of giving the subject careful attention should be impressed on our Experiment Station. They have performed good work for us in the past, but they must still keep everlastingly at it, not only in finding a sure and practical remedy for the "apple scab," but for the little fellow called the Tripetea pomonella or apple maggot, although the ravages of this pest have not been so bad in our section of the State as in years past, still we want to conquer it if possible.

I have given you these few suggestions hoping that their consideration will be helpful to the fruit growers of our State and beneficial to our Society.

The committee to whom the President's Address was referred before the close of the meeting made the following report which was accepted:

We would call your attention to that part of the address in reference to the engaging an expert to attend and assist us at our annual exhibition, and also for the necessity of returning the money to the permanent fund which is now needed by the Society, as soon as practicable. We endorse the idea of holding a summer meeting for the exhibition of strawberries and with the increasing interest in the culture of small fruits we think such an exhibition could be made both interesting and profitable.

THE YOUNG ORCHARD.

By Charles E. Wheeler, Chesterville.

We consider this subject to see if we can have better returns for our labors in the years to come. None of us are so well advanced but some good may come to us from a consideration of the subject. One thing must be with us all the time, "What is worth doing at all is worth doing well," but this must be in such a way that whatever is produced shall be at the lowest cost possible.

Let us consider a young orchard, such as may be considered a commercial orchard, the fruit of which is to be shipped to some market, either as choice apples or canned and evaporated apples. Let us select our soil, our trees, and the kinds, looking after the young things for a few years; and by that time others can go and take care of the fruit. Go into any portion of the State, and notwithstanding the conditions, you will find fine orchards. But the speaker's ideal place to plant a young orchard would be upon high ground, with natural drainage, sloping to the south or southeast. Under these circumstances we should expect to find good strong, moist soil upon a granite foundation that would furnish fine drainage. There are many farms in Maine thus located, and so long as they can be purchased at low prices, it is doubtful if it will pay to select such land as will require a great expenditure of time and cash to drain.

Having made our selection of the farm, the next consideration is, where shall we place our trees? We are going to build up an orchard, and it will require the best field. If you can turn over the sod, and keep it so for the first few years, using the cultivator often, giving the young trees as good care as your neighbor does his corn, you may at least expect as good returns. If you find it best not to do this, stake your field off two rods each way, thus securing a straight row. Dig around each stake a hole from two to four feet across, down through the soil, leaving the bottom well stirred up with the spade. Two persons can do the work at much better advantage than one. The turf is cut in a circle around the stake, quartered and removed to one side; the soil is always placed upon the upper side, as it can be worked into the hole easier. Take home-grown trees and remove them to their new quarters at once. Two-year-old trees, and even older, should be taken. We cut all roots from the size of a pencil up; all damaged ones are removed, and if any have been wrenched off, we make a clean-cut wound of it. The rootlets take up the plant food, and with a good clean cut the fine roots start out very quickly, and begin their labors. The long or large roots are of but little worth. Do not be afraid of using the knife in pruning the top.

In transplanting a tree, one should hold it in place while the other works in the first few hoes' full of the fine soil. Place the tree an inch or two deeper than it stood in the row, and lean it towards the south, so as to prevent sun scald. In filling in the soil, place the roots much the same as they were when the tree was in the nursery row; tread the earth down solid, for roots do not grow or thrive on air. Fertilizers should be in the shape of fine ground bone and muriate of potash—300 lbs. of the former, to 100 lbs. of the latter, well mixed. Never use any form of barn manure; just so sure as you do, it will burn the roots, and your tree will receive a bad check. The last few shovels of the soil should remain; the turfs turned upside down and well tramped down, then the remaining dirt cleaned up without tramping. Place mulching around the tree; it keeps the soil damp, loose and fresh, free from weeds and grass, unlocking the plant food through its action much the same as we do with the cultivator. Where the trees are exposed to high winds, stake them up. Trees near fences where the snow may drift, should be well protected by stakes the first few years, and should be carefully looked after in the early spring, when the crust is forming and the snow settling down.

If the trees are seedlings, do not graft till they have reached such size that the cleft graft can be introduced. This is the best form for the Baldwins. Some trees do not shape well until you remove the tops. Good barn manures may be used in small amounts for fertilizer after the first year. Leaves, leaf mould, muck, and other material lying around on many farms could be used. Straw, leaves, brakes and water grasses used as bedding under horses, and worked over by the pig, make one of the very best and cheapest of plant foods. If we touch upon varieties, the Baldwin, Hubbardston, Spy, and Ben Davis, make a very full list, unless we may wish for the Fall Harvey, which sells for a good price, or in an over abundant year is one of the best for evaporating or canning. Of these kinds, let the Baldwin and Spy form eight-tenths of your orchard.

The borers come first in the list of hurtful insects, and they are very persistent. The trees should be looked over in May and October. No better way is known of ridding the orchard of these pests than to dig the imps out with penknife and wire. The knife is all that is required the first year, but some will be overlooked, and then a wire is needed. For mice, poisoned barley scattered along the stone walls is good feed. Laths cut in two and placed around the tree, making a complete box, fastened with No 32 steel wire, is the very best shield. The bark louse infests many Maine grown trees. Hard wood ashes thrown into the tree on a misty day, just prior to its leaving out, will destroy them, and is an easy remedy. We are spraying some for the coddling moth, and are very well satisfied with the result.

SOME PLANT DISEASES AND THEIR REMEDIES.

Professor W. M. MUNSON, State College, Orono.

All known plants are divided into two great classes—Phænogams or flowering plants; and Cryptogams or non-flowering plants. The former are characterized by the production of flowers and seeds; and as a rule are provided with a green coloring matter—chlorophyll—through the agency of which the inorganic constituents of the soil, carried upward by the movement of the sap, are combined with the carbon dioxide of the air into organic compounds—starch, sugars, oils, etc., essential to plant life and growth.

All cryptogams are without flowers or seeds, but many of them, as ferns, mosses, sea-weeds, etc., contain the chlorophyll necessary to the assimilation of inorganic matter. One important class, however—the fungi—are entirely without this agent, and necessarily depend for subsistence on some store of organic material, either animal or vegetable. In other words, a fungus is a plant; but possessing no green coloring matter, it cannot utilize inorganic matter like ordinary plants, and must live on materials already prepared by other plants. This material may be found either in living or dead plants or animals.

That part of the fungus corresponding to the root stem and leaves of other plants—the *mycelium*—consists of very slender thread-like tubes which may grow singly, or may form intricate masses, the threads being more or less grown together. As compared with the fruiting portion, the mycelium is very small and insignificant in appearance. This may readily be seen by comparing the edible part of the ordinary mushroom with the mold-like "spawn." The part which we eat is really the fruit-bearing part of the fungus, and the *spores* which take the place of the seeds of tbe flowering plants are borne on the gills under the cap. These spores which are exceedingly small and are seen as a black dust when fully mature. The same relation between fruit and mycelium holds with most of the fungi with which we are concerned.

I have said that a fungus must live on organic matter, either living or dead. Fungi are thus readily divided into two distinct classes: *Parasites*, those obtaining their nourishment from living plants or animals; and *saprophytes* which feed wholly on dead tissue. It should be added, however, that some fungi belong to both classes—being parasitic at first and continuing to live after the host has been killed. It is with the first class—parasitic fungi —that we are especially interested at this time.

Within the past fifteen years the number of plant diseases has increased with alarming rapidity until there is scarcely a fruit or vegetable which does not have its specific fungous enemies.

What is the reason for this increase? First of all, perhaps, is increased knowledge of the causes of many failures. Formerly crops were injured or destroyed and the fact was accepted without attempt at an explanation, or the blame was thrown on the moon or the weather. Now the mycologist is called and with his improved means of study, he is soon able to tell us the exact cause and frequently the whole life history of the pest.

Again, many of the parasitic fungi best known at the present time originated on wild plants and on such were not considered of special importance. When, however, some closely related plant in garden or orchard was attacked, attention was at once arrested and it was said a new disease had appeared. (*e g.* "black knot" of plum and cherry, and "orange rust" of blackberry.)

There are various ways in which parasitic fungi injure their host plants; and no part of the plant is exempt from attack, roots, stems, leaves, flowers, and fruit, are all in danger. By far the most common and important injury caused by the parasites is in the appropriation of nourishment belonging to the host. This results in the falling or deformity of fruit or leaves, according as the attack is early or later in the season.

Again, when the fungus grows upon the leaves and stems of the host it not only reduces the amount of the food supply but it often prevents assimilation or the formation of a new supply, thus reducing the vitality of the plant affected.

It is quite probable that the intensive culture practiced at the present may have weakened the constitution of many of our fruits and vegetables, rendering them less able to resist the attack. The tendency of modern methods is to cause plants to vary in certain directions most valuable to man rather than to retain those characteristics best for the life and health of the plant. If, then, man would use to the best advantage this tendency to vary in certain directions, he must provide the best environment, and must so far as possible, prevent the attacks of insect and fungous enemies.

I have said we must if possible *prevent* attacks of fungous enemies, for cure is usually out of the question. The fact that the mycelium of the fungus is usually beneath the surface of the plant affected makes "remedies" ineffective. There are a few instances —as some of the surface mildews—which are exceptions and where remedies are effective; but such are rare.

In the treatment of fungous diseases, two distinct lines should be followed: 1st, hygienic; 2nd, preventive. There are definite laws of health for plants as well as for animals, and in either case neglect of those laws invites disease.

Common sense would demand first of all that the trees or other plants be in good vigorous condition. Healthy vigorous plants are always less susceptible to attack either of insects or of fungi than are those which are weakly or stunted.

Next remove all possible sources of infection, such as wild plants subject to the same disease, leaves and decaying fruit which are affected and which form a very common and the most important source of trouble. The wild plum and cherry trees are an ever present menace to plum growing in Maine because they form a well nigh indestructible source of infection from black knot. The wild blackberries in any locality often harbor the orange rust to such an extent as to render impossible the cultivation of the choicer varieties. Diseased fruit and leaves effectually harbor parasitic fungi during the winter, and on the approach of warm weather the spores develop rapidly and are at once liable to be carried to the opening buds by the first breeze that stirs. No preventive measures should be expected to be effectual if such sources of infection are left undisturbed. It is not enough to feed diseased fruit to the hogs or to place it on the compost heap, but it should be carefully gathered and burned.

The mycelium of some fungi lives from one year to another in the branches or canes of affected host plants. This is noticably true of black-knot, of the twig-blights and of raspberry anthracnose. In such cases the first treatment demanded is the removal and burning of all affected canes or branches. I would again emphasize the importance of burning. A diseased branch left on the ground is just as much a menace to remaining plants as if it had not been cut. In some instances, as in case of the dreaded "black-knot," it is often thought advisable after removing a diseased branch to make an application of some material to the wound in the hope of destroying any possible remaining portion of the mycelium.

Dark moist weather, and damp shady locations are always conducive to the development of fungous diseases. Hence open training, and thorough drainage, both of soil and atmosphere are always advisable.

Improved environment and the removal of infection will not always protect our plants from disease. The advance in the knowledge of the nature and value of fungicides and of methods of application, has been even more rapid than the knowledge of the fungi themselves.

For several years sulphur in some form has been used to a greater or less extent. Powdered sulphur is one of the most valuable fungicides we know for the treatment of surface mildews and of certain "blights." It has been found that the best results are obtained from the use of sulphur if the application is made on a dry day when the sun is shining—why, is not known. For green house work we have found the "liver of sulphur" (sulphide of potassium) very satisfactory. For most plants dissolve one ounce liver of sulphur in two gallons of water.

At the present time, some of the salts of copper are regarded as the most valuable aids in dealing with fungous diseases. The sulphate of copper ("blue stone") is the cheapest of the salts and either alone, on dormant plants, or in combination with lime in the form of "Bordeaux mixture," is usually considered the most satisfactory.

A word concerning the preparation of "Bordeaux mixture" may not be out of place in this connection. As usually prepared the mixture consists of six pounds copper sulphate, four pounds quick lime and fifty gallons water. The copper salt is dissolved in a wooden tub, the lime slaked in a separate vessel and when ready for use the two are mixed and diluted as above,—care being used that the lime is strained through a cheese cloth or a fine wire screen, to prevent clogging the nozzle.

The copper sulphate will dissolve much more quickly if placed in hot water, and it is found, too, that the action is greatly hastened by suspending the salt in a coarse bag instead of placing it in the bottom of the vessel and pouring water over it.

Bordeaux mixture should be used as soon as prepared, as it soon deteriorates in value; but in spraying large orchards much time may be saved by preparing stock solutions of both the lime and the copper salt as suggested by Waite* and Swingle† of the U. S. Department of Agriculture.

*Journal Mycology, Vol. VII, p. 336. †Ibid, p. 365.

If we take a barrel holding just fifty gallons, dissolve fifty pounds of copper sulphate in this barrel and then fill with water, we shall have a solution each gallon of which contains one pound of the copper salt.

(It can readily be seen that the amount of water displaced by fifty pounds of copper sulphate is of considerable importance, hence the water should be brought to the required mark after dissolving the copper.)

In the same manner a stock preparation of lime may be employed as suggested by Mr. Swingle: "A barrel is taken, the capacity of which has previously been carefully determined, and twice as many pounds of stone lime are placed in it as it holds gallons. The lime is then slaked. If the slaking has been properly done the milk of lime will fill two-thirds to three-fourths of the space; then water is added to bring the milk of lime up to the mark. After stirring thoroughly a gallon will contain the equivalent of two pounds of fresh lime." It is of course very important that the mixture be stirred thoroughly each time a quantity is dipped out, as a gallon of clear lime water will contain only about one-sixth ounce of lime instead of two pounds.

Having the stock solutions, as described, it is a very simple matter when spraying to take six gallons of the copper sulphate solution, two gallons of the milk of lime and dilute to fifty gallons. The mixture should be very thoroughly stirred with a paddle before using.

The stock solutions may be kept for several days or even weeks if carefully covered and in a cool moist place.

It has been found by some experimenters that the addition of soap to the Bordeaux mixture greatly increases its wetting properties and consequently makes it very much better for spraying such plants as have a waxy coating on leaves or fruit. The quantity of soap suggested is about one-half of the total weight of lime and copper sulphate used, or enough to make the mixture foam well when thoroughly stirred. In the fifty gallons of mixture described we would use about five pounds of soap. The soap is best prepared for use by shaving in thin slices and dissolving in hot water. The very cheapest soaps are as good for this purpose as are the more expensive ones.

SOME PRACTICAL APPLICATIONS.

1. *Apple Scab.*

I doubt not most of you are familiar with the dark colored spots or "scabs" which appear on some varieties of apples—notably Fameuse, Maiden's Blush, and Golden Pippin. These spots represent but one stage in the life history of one of the parasitic fungi already referred to, (*Fusicladium dendriticum.*)

The disease appears on the leaves, usually on the under side, as brownish or olive colored spots. These spots if numerous run together, become blackish in color and finally the leaf tissue dies. In cool wet weather the fungus often spreads very rapidly and, attacking the foliage and young fruit early in the season, causes almost total loss of crop and greatly weakens the trees. The leaves are both lungs and stomach of the plant, and any check to these organs must seriously affect the vitality of the tree. If the attack is late, after the season's growth is completed, no special damage is done except to injure the fruit.

While the spots if recently developed do not directly injure an apple for immediate use, they greatly affect its appearance and will continue to grow and spread, and the fruit will decay much sooner than if not affected. On the other hand, fruit attacked early in the season will either fall prematurely, or will be deformed and cracked, the parasite utilizing all of the materials for growth on the side affected.

For several years I have conducted careful experiments with the hope of arriving at definite conclusions concerning the use of certain chemicals as preventives of the disease in question. As a result of this work I feel safe in asserting that we may to a large extent control the attacks of the apple scab by the use of the Bordeaux mixture already described.

In almost every instance where comparisons have been made there has been a marked difference in favor of the sprayed trees—the gain in the per cent of fruit free from scab amounting, in many cases, to more than half of the crop.

The accompanying table shows very clearly the results obtained last year.

Treatment.	Number fruits examined.	Free from scab.	Slightly scabbed.	Badly scabbed.	Per cent free.
Check (not sprayed)	552	212	326	14	38.3
Bordeaux Mixture	546	436	102	7	79.9

Although the season was very dry and the per cent of perfect fruit on the unsprayed trees was much higher than usual, the sprayed trees showed an average increase of nearly forty-two per cent.

During the season just closed the advantage of spraying was even more marked. The season was very wet and the disease appeared soon after the fruit was formed. As a result the crop was a *total failure* on trees not sprayed, while on adjacent trees which were treated with Bordeaux mixture there was a good average crop relatively free from disease.

Now it is not claimed that we know all about the use of Bordeaux mixture, for there are problems of a most important nature concerning the preparation and application of the material, which are still unsolved. At the present time, I may sum up our knowledge of the treatment for apple scab as follows:

(1) Spray the trees early in the season, before the buds expand, with a solution of copper sulphate—one pound to fifteen gallons water.

(2) Early in May, before the blossoms open, spray with Bordeaux mixture.

(3) As soon as the fruit "sets" spray a second time with Bordeaux mixture. (It is well at this time to add Paris green at the rate of one pound to two hundred and fifty gallons of the mixture to destroy the larvæ of the coddling moth.)

(4) Make at least two subsequent applications of Bordeaux mixture at intervals of about three weeks.

2. *Pear Scab.*

A fungus closely related to the one just mentioned is the Pear scab (*Fusicladium pyrinum.*) This fungus attacks the pear in the same manner as does the apple scab its host, and indeed the resemblance between the two species is as close that they are often considered identical. It is because of this disease that the Flemish

Beauty has almost been superseded by less valuable sorts in many localities.

Unfortunately there has been no opportunity for personal investigation of this disease at our experiment station, since there are no bearing trees available. However, from the marked success attending the work of other experimenters I am convinced that the treatment suggested for apple scab will be satisfactory in this case as well. Professor Beach of the experiment station at Geneva, N. Y., as a result of some work conducted on a commercial scale, found that while the average cost of spraying each tree five times during the season was about forty-eight cents, the increase in the commercial value of the fruit actually sold was about $5. In other words, while the average receipts from the Seckel trees which were sprayed were $5.70 per tree, the average receipts from the unsprayed trees were but ninety-three cents. White Doyenne gave even better results.

3. *Black-Knot.*

To every plum grower in the land the very name "black-knot" suggests an eternal struggle with the powers of darkness, and it is unnecessary to speak of the outward appearance of the disease.

Many have supposed the "knots" or wart-like excrescences to be caused by insects, for frequently on cutting open one of the warts larvæ will be found inside. But in the first place insects are not always present—never in the early stages of growth; and in the second place no gall producing insects have ever been found. There can no longer be any doubt that the trouble is due to a parasitic fungus—*Plowrightia morbosa.*

Without entering into details, we may briefly trace the life history of the fungus. It is generally conceded that the knots first make their appearance in the fall, when they may be seen as slight swellings of the bark along the branches. But little growth is made till the following spring when the increase in size is very rapid. This rapid growth is specially noticeable about the first to the middle of June when the bark which at first covers the diseased tissue is burst open and the knot presents a dark green velvety surface due to the immense number of spore-bearing stalks (conidia) which are produced at this time.

Later in the season the surface of the knot becomes rough and covered with little pimples which are the receptacles of another kind of spores (stylospores.) The fungus remains alive in the knot till the following spring when it dies leaving simply a spongy mass of dead tissue, which may as before remarked afford a harbor for insects.

The best remedy for black-knot is "a good sharp knife and courage to use it." Many successful growers favor an application of kerosene to the wound after removing a "knot." Such an application should be made with a small brush, and care must be used that the oil does not run down on the bark. It is well to add a little pigment, as red lead, to the kerosene to better indicate where work has been performed.

4. *Plum-Rot or "Mummied Fruit."*

Plums, cherries and peaches are frequently attacked by a "rot" which may destroy the entire product just before ripening. This rot (*Monilia fructigena*) appears on the surface of diseased fruits in the form of a grayish white mould. This mold consists mostly of little tufts of spores, the mycelium being among and through the tissues of the fruit. On a single diseased plum may be produced thousands of the little spores, each capable of infecting another fruit.

The rapidity with which the disease may spread in warm, moist weather is almost incredible. In two days, under favorable conditions, a spore may germinate and grow sufficiently to produce more spores.

The fruit which is affected often dries up and remains on the tree; and the fungus lives over winter in this "mummied fruit" or in the twigs which are sometimes affected.

The treatment of this disease is that already suggested in general terms, viz: collect and burn all affected fruit; spray the trees early in the season with the copper sulphate solution and after the fruit has set spray once with Bordeaux mixture.

A second spraying with Bordeaux mixture is hardly advisable because of injury to the appearance of the fruit; but if the season is very favorable to the growth of fungi, it is well to make an application of modified *eau celeste*. This material is prepared as follows: Dissolve two pounds sulphate of copper in two gallons of hot water. In another vessel dissolve two and one-half pounds carbonate of soda (sal soda); mix the two solutions and when ready for use add one and one-half pints strong ammonia water and dilute the whole to thirty-five gallons. It is well to make the stock solution at least one day before it is wanted for use, and to mix a considerable quantity, merely observing the proportions suggested.

Conclusion of the Whole Matter.

I should like to speak of several mildews and blights and rusts which are of special importance to the fruit grower; but fear I have already wearied you. I cannot close, however, without urging upon every grower here the importance of the conflict in which we are engaged. We are living in a day when there is sharp competition in all lines of horticultural work, and the successful man must fight if he would win. The surest financial returns in fruit growing lie in the production of the *best.* Fancy fruits for fancy markets is the watchword among progressive men today.

The time has passed when we could simply plant and cultivate and harvest. We must see that the plants are given suitable environment and are protected from attack. If our trees are hungry we must feed them; if thirsty, give them drink; if diseased, ascertain the cause and apply remedies.

In all of the work science and practice must go hand in hand. At the college we shall continue to study causes, effects and remedies. It remains for the fruit growers of the State to apply the knowledge gained to individual cases.

APPLE AND PEAR CULTURE.

By O. B. HADWEN, Worcester, Mass.

Our starting point in pomology is directly traced to the early settlers and although for nearly two centuries progress and advancement were comparatively slow it was none the less firmly rooted. The science, practice, and the art of pomology had barely dawned in the beginning of the present century. During the last fifty years its advance has been truly marvelous.

At present no owner of lands seems to regard himself as a true American of the higher type who neglects to plant fruit trees.

But I do not propose to occupy your time with theories in fruit culture for the scope is so broad I can embrace but few of its phases of a more practical nature.

Fruit trees serve a three fold purpose of supplying food, ornament and shade, either of these would repay their cultivation and care. In their variety fruits succeed fruits week after week, month after month, and with proper facilities for preserving and keeping we may have fruit the year round.

It rarely happens that one person can successfully cultivate many kinds of fruit; specialties are found more condusive, and better suited to the conditions and taste of each individual.

The orchardist who succeeds well with his trees in grass land of great depth and fertility, should not recommend or prescribe grass for orchards in thin and impoverished soil. The man who has a shallow soil and has injured the roots of his trees with the plough, because they are near the surface of the earth, should not object to the thorough manipulation of deep soils. Therefore it is absolutely necessary for each and every grower of fruit, to diligently and patiently search out and study his situation and surroundings, if he desires the best results to reward his labor.

Let me call your attention to a few of the essential conditions necessary for producing good orchards and fruit, where both climate and soil are favorable. In selecting trees we would choose those from two to four years from the bud with straight stems and shapely tops with good fibrous roots, they should be carefully planted out in deep soil in generous holes dug for the purpose, and receive liberal treatment for the first ten years. The orchard should be so situated that the trees may receive the full benefit of the sun's rays, therefore thick or crowded planting is not desirable. A sheltered situation should also be selected.

Orchards exposed to bleak, and especially to drying winds, at the time they are in blossom, are very liable to be injured, the winds drying and destroying the adhesive qualities of the pollen of the flower, and wafting it from and beyond the uses which nature intended it to serve.

Thus shelter is important in the early stages of fruit growth, as it is later; at maturity, it is as important to the orchard as is good cultivation, and without shelter, crops of fruit are more uncertain, and many orchards failures.

Shelter from winds is however easily obtained; by planting belts of trees upon land surrounding the orchard, and perhaps no better tree can be found for that purpose than the European larch, in this portion of the country.

If set at the same time of the orchard complete shelter even before the trees come in bearing; and even if neglected at that time, they can be planted out afterward, and in six or eight years will be sufficiently grown to afford protection.

There are other trees, which also are desirable for protection to the orchard. The white pine, the Norway spruce, the hemlock, these trees are of more spreading habit than the larch requiring more room; but it is always desirable and commendable to add to the beauty of the landscape; a variety of trees, if judiciously planted, having a regard for appearances, will be both ornamental and useful.

But many farmers and especially those of the older school, have strong objections to trees, and cherish the dogma that they injure grass and grain crops, more than do the winds, at the same time forgetting all about the shelter and advantage they afford all other crops.

But there are those that love to believe that true economy and true taste are accordant, and that the graces as well as the profits of life may be kept alive and in view by the practical aims of all farmers when well directed.

In considering the cultivation of the apple we have therefore concluded that due economy requires the orchard, and trees growing out of the orchard, as far as may be possible, should be well sheltered from fierce winds from any quarter, and especially from the drying winds blowing from the north or southwest, to insure good crops. If large annual crops of fair fruit are wanted no other crops should be taken from the ground unless enriched. But if the soil is deep and retentive of manure and moisture and trees are planted at least forty feet apart, other crops may be taken from the land without apparent injury to the apples, but the soil should by no means be allowed to become poor and should annually receive a dressing of suitable manure.

Experience teaches that for extensive orchards, trees planted forty feet apart is a desirable distance, the trees having space to grow shapely and affording room for other crops. It must also be remembered that the roots of trees occupy and are nourished by the lower strata of soil to a considerable extent and the tops derive sustenance from the ocean of atmosphere that surrounded them. While we would cultivate the orchard during the early growth we are satisfied that continued ploughing is not essential for the best results; in fact the keeping qualities of fruit are found to be better where fruit is grown on soil, not often ploughed, but enriched. We are unable to satisfactorily account for this, but from continued observation we are confirmed in this opinion.

In the earlier history of Pomology, in this country, the fruit grower had but few insects to contend with, but later experience proves and it is found that just in proportion as you increase the cultivation of fruit insect enemies increase.

The difficulty thus far, it would seem, is to bring the mind of the fruit grower to realize the fact that insects must be destroyed to render the business profitable. We are constantly expecting that nature will come to our aid, and with some of her forces, will all at once destroy the insects that are destructive to fruit.

But too often the grower continues to be negligent. and the insects to increase, and, with few exceptions, have it all their own way. The orchardist cannot find time to contend with so small an enemy; in fact too often does not realize that his fruit is nearly worthless until he is ready to gather and sell it. Can we complain if the insects avenge our neglect?

We have strong encouragement to make great efforts to prevent the depredation of insects, as the demand for fair fruit is always good and prices, both producer and consumer agree, should be higher for choice and well grown.

A large portion of your State lying as it does within the great fruit growing belt, is, both in climate and soil, especially favorable to the growth of the apple. Many varieties of apples have here had their origin, that are proving valuable wherever they have been disseminated and grown.

Care is the price that must be paid for the best of all agricultural or horticultural products. And care in gathering and barreling fruit for storing and keeping is of the utmost importance. In fact how often is fruit gathered in a manner as would seem as if the chief end to be desired would be to promote decay as rapidly as possible. If apples are expected to keep well they must be picked from the trees and handled carefully.

Barrels are found the most convenient package for apples, but should be washed and thoroughly cleansed and dried before using; care should be taken that no nails protrude through the staves. The fruit should be carefully placed in the barrels and gently shaken and pressed into them as compactly as possible to prevent any motion of the fruit after the barrels are headed. Each sort should be marked and placed where the temperature is low and uniform if possible. If apples are to be stored for winter or late keeping the sooner they are placed in a cool and uniform place the better. A fruit house or cellar constructed with a view for the purpose is best, but most growers usually have to resort to their cellars.

The chief requisites for the preservation of fruits from October to May or June following are a uniform low temperature and in autumn may be obtained by giving abundant ventilation on cool nights, and be closed when the atmosphere is warm. Fruit should be maintained or kept in as nearly as possible in the condition when gathered. The gradual ripening process or the fermentation of the juices, premonitory to decay, should be checked and kept in a dormant condition, when maintained nearly at the freezing point the mellowing or ripening process in the fruit nearly ceases. Fungi and mildew, the primary cause of decay, do not germinate. Under these circumstances, the best late keeping results are promoted, thereby the prices which apples are sold differ very materially between October and June and are often as one to five, thus the growing price in the cellar is of full as much importance as the growing fruit in the orchard.

New England is also favored with a variety of soils which is found favorable to the growth of the apple. Experience also teaches that one kind of soil is not adapted to the growth of all kinds of apples. Some thrive best in a loamy soil, some in sandy, others in a gravelly or clay. Keeping these things in view, it is plain that several varieties of apples, when planted in a single orchard, is more reliable for a crop as seasons come and go, than one variety; sometimes climatic conditions prove injurious to one or more varieties, when others in the orchard are uninjured. In the earlier times, and even now, there were many theories not well founded, relating to orcharding. Of late years growers are changing their views, and the majority of orchardists endeavor to understand the reason of their practice, under these conditions the march of progress has been rapid, and success is in proper ratio to the care the orchard receives. I have for some years given more especial attention to the growing of apples than to other fruits. In the autumn of 1843, I planted the apple seeds from which the trees in my orchard of twenty acres are planted, budded the trees, and planted them, and have watched their progress of growth and bearing ever since. The trees now are at maturity and bear full crops, and I have received a vast amount of pleasure and a reasonable amount of profit from my husbandry.

The pear is a fruit that the average American is especially fond of, and within the past half century has given a great amount of thought and labor to its cultivation.

Not only the orchardist, but every one owning a piece of ground, however small, does not feel quite satisfied without a few pear trees. The pear has drawn out perhaps more enthusiasm than any other fruit which we have cultivated. There are now over 3,000 sorts that are recorded and described, enough perhaps for the most ardent cultivator. This number is perhaps well enough for those whose money, time and taste permit, but the orchardist, or those who grow pears for market, or home use, a dozen of the best sorts are found sufficient for the most refined and cultivated taste, and requiring far less care. The public at large have never become able to know or name even a dozen sorts.

By reference to Rhind's Vegetable Kingdom it will be seen that the the pear tree is indigenous to the northern sections of the temperate zone, flourishing as far north as fifty-seven degrees, and it has been acclimated and grown within the boundaries of twenty-seven degrees.

In attempting to acclimate and grow the pear in a warmer climate its primitive habits should not be lost sight of, neither the change in the conditions caused by good or excessive cultivation of the pear. Very high cultivation only can produce specimens of fruit that bring the highest price in market, or receive the prizes at exhibition. The primitive conditions of the pear are entirely changed by its present cultivation, which may ultimately prove to be one of the causes of pear tree blight Therefore as only a grower of the pear we approach the subject of pear tree blight with considerable caution, well knowing the diverse and contrary opinions entertained by pear growers, as well as by scientific men, and the mystery hanging about the whole subject. We can only attempt to relate, what would seem by long experience, apparently to be some of the causes pointing to pear tree blight and the mystery about it which baffles both scientific and practical men.

In the cultivation of fruit of any kind it is undoubtedly true that repeated grafting upon stocks grown from seed for a long continued duration of time, has a tendency to weaken the primitive vitality of the tree.

[Mr. Hadwen recommends the following as the best twelve varieties of pears: Beurre Gifford, Clapp's Favorite, Bartlett, Sheldon, Seckel, Beurre Bosc, Beurre Hardy, Urbaniste, Beurre d'Anjou, Duchess d'Angouleme, Dana's Hovey, Lawrence.—SECRETARY]

The thousands of acres of orchards and gardens which may now be seen in New England, manifest the strongest contrast with that in former years, and for many years New England was in advance of other nations of the country in horticulture. The natural conditions which govern our soil and climate require more skill and brain in its manipulation to insure success. Special manures and fertilizers are found to be a necessity, the art of grafting and budding, with other approved modes of propagating have to be acquired and made use of; judicious pruning is one of important practice in the orchard, and thinning the fruit to promote size and good flavor, is equally necessary. It would seem, if we may judge from the new fruits of the last fifty years, there is no barrier to obtaining by hybridization fruits of any size, quality or color, if the proper knowledge is used, with a requisite amount of skill and patience, to produce almost any desired size or quality, together with fine aroma and brilliant coloring. Science and practice have revealed these possibilities which only awaits the skilled cultivator to demonstrate in all the lines of fruit growing.

As time goes on, with the vast increase of population sure to come, increasing the demand for remunerative industries, and the increased consumption of fruits, habit and custom will demand, with an educated taste, these conditions will require increased area of orchards and gardens, which must become one of the foremost agricultural pursuits in our New England States, situated as we are midway between the equator and the north pole. Lands that are now considered only fit for pasturage or wood lands, steep and uneven, too rocky to plough, will in time be planted to orchards of apples. We will acquire the skill to grow good trees that will bear good fruit without cultivating with the plough; other methods of preparing land will be acquired, less stirring the soil, but liberal dressing will be in order. If New England can grow better flavored apples than other sections, why not avail ourselves of this advantage, as Florida does with the orange, California with the grape and stone fruits, Delaware with peaches, as each section of country has its natural aptitude for its specialties.

DISCUSSION.

Ques. What is the best method of applying dressing and the best kind of dressing?

Ans. Every grower has got to adapt himself to the circumstances and conditions that surround him. He would make no mistake in applying any manure. If he wants to do his best perhaps he would apply a variety. It would be well to apply stable manure; it would also be well to apply unleached ashes and fine ground bones; but be sure to make an annual application if you want your fruit to bring the highest price in the market and your trees to have a healthy and vigorous growth. If you expect to get a good crop of apples or grapes on an improper soil you will be sure to be disappointed. The only way for a man to get the most out of his fruit culture is by liberal treatment.

Ques. Would you recommend the keeping of sheep in an orchard?

Ans. I have tried that experiment. Some ten years ago I fenced off about an acre and a half of my orchard, and bought some sheep and put them in. I had heard that they were good to eat apples and destroy the insects. Experience teaches that while they gather their sustenance from the ground and distribute their droppings, thus benefiting the trees, they do not eat the apples. The sheep will take a bite out of an apple and leave the remainder, especially where apples are plenty. I should rather run the risk of swine for the benefit of an orchard than sheep. Still I should not hesitate to put sheep into an orchard and it would probably be beneficial in the long run; but if you expect they are going to eat the apples you will be disappointed.

Ques. Some people in applying dressing to trees put a larger amount near the tree than at a little distance from it. What is your opinion about that?

Ans. My practice is to spread the dressing as far as the limbs extend when dressing the apple tree only; but I like to dress the whole ground. Roots have a peculiar faculty of finding their food. It is wonderful how much of a kind of root knowledge they possess. I have seen an instance where a block of trees were planted five feet apart, and the roots had started to grow in all directions. Outside of the block, on one side, was a bed of rhubarb made very rich. After the roots of the row of trees next the rhubarb had started to grow in the opposite direction they stopped, turned and went towards the rhubarb, thus showing that roots do know something.

There is no kind of trees but do better by liberal treatment, especially ornamental trees. No farmer is really up to his business who neglects to plant ornamental trees. I have some ornamental trees which get a half cartload of manure every autumn, and the foliage is wonderful. Trees that are enriched show a very marked difference in the foliage. I did not find that out until, perhaps a dozen or fifteen years ago. I went to the grounds of Mr. Hunnewell, who perhaps has the finest ornamental trees on this continent, and I was astonished to see how different his foliage looked from mine; but when I came to lift the limbs and look underneath them I saw they were very liberally treated. I went right home and commenced the same process, and I am surprised to see the difference in my trees which the liberal treatment produced.

Ques. What would you say in regard to the protection of orchards? My experience and observation has shown that some of the very best orchards have no protection whatever, but an exposed location. Of course this would allow of the apples being blown off, but most certainly those orchards did the best in our locality.

Ans. The object of protection is to keep the fruit on the trees. Trees will thrive without protection, but you do not want the fruit blown off. It is a little discouraging to have fruit blown from the tree and become unmerchantable when you want to get full price for it; consequently I think it is well worth while to protect your trees.

Ques. In picking apples would you recommend, instead of having your picker drop his small apples on the ground and put the others into a basket and empty them into a barrel, that he should have a sorting box in the tree, and let five or six men pick apples into baskets as they would happen to, and then one man take his sorting box and sort them all out?

Ans. That would depend somewhat on how the man was situated. I am situated near a large market, and after some experience have concluded that the better way for me is to have the men drop the unmerchantable fruit upon the ground. And each man in emptying his basket is instructed to remove the stems and leaves. It is well to have a little piece of old carpeting in the basket for apples are very sensitive to injury, and if you want the best results you must take the best care of them.

Ques. What varieties do you depend upon?

Ans. The Baldwin is the great apple for the million. You can sell more Baldwins than you can any other variety of winter apples, and so far as I know the Baldwin to-day is the leading apple in Massachusetts. I think as time goes on there will be apples that will supercede the Baldwin, but those things take time. I have some apples that bring me a dollar a barrel more than the Baldwin, but in no great quantity. I do not suppose there has been a Baldwin put in my house for a quarter of a century; the reason is we have better apples. And people will soon learn to discriminate between the quality of apples. The Yellow Bellflower is perhaps not as profitable an apple to grow for the market as the Baldwin, but for family use at this time of the year there is scarcely any better apple. In many sections during the month of January it is one of the best apples to cook that I know of. The Baldwin lacks quality,—is not really a first class apple, but you can sell more of them than of any other kind.

Ques. To what extent is the packing of fancy fruit in crates being carried on in Massachusetts?

Ans. To no very large extent; that will do very well on a small scale, but if you have 1500 or 2000 barrels of apples and attempt to put them into crates you will have a job. The barrel is stored more easily in the cellar, also. Still I know of one very excellent fruit grower in Weare who puts his apples into crates. He has an apple called the Granite Beauty, which is a first class apple and brings a good price. If a person has plenty of time to attend to this, perhaps it is all right; but with a large quantity of apples you cannot bother with crates.

PROGRESS OF ORCHARDING AND FRUIT CULTURE IN PISCATAQUIS COUNTY.

By Calvin Chamberlain, Foxcroft.

I propose to tell you some things about orchards; for at one time Dr. Holmes and I and a few other fellows knew a great deal about them; but I shall tell you about some other things first.

I came to this Piscataquis county in October, 1810. I came to help my father make a farm, which he had begun to do alone. I came too late in the season to help him any that year. I soon learned that men did not work at making farms all the year. They did something else a part of the time. I had a good deal to do before I had learned how to work all day with my father. I guess I was pretty busy the first year I was here.

The next summer, 1812, my father cut ten acres of the trees on the hillside south from the house. There were many kinds of trees, many large hemlock and spruce. One windy day in September my father set fire along the north side at the bottom of the hill, and the fire went up the hill so quick, that the whole piece was burning at the same time.

In the summer of 1814, a woman kept a school in our neighbor's barn only a quarter mile away. It was not a good place for a school. When the weather was not good the door was shut and all the light came through the cracks between the boards. This place then had a name. I learned at home and at school to say that we lived at Foxcroft, County of Hancock, and Commonwealth of Massachusetts, and Mr. Strong was governor. One man had a log house with two rooms. The school was kept in one of the rooms in the winter. Some large boys and girls went to school then. The trees were all the way from our house over there. A road was cut for a sled.

Our father had a pair of oxen that liked to take us over there on the sled and they would do it pretty quick when the road was good. It was not more than a mile. The large boys and girls at that school had all moved here from Oxford county. A log schoolhouse was built after that. The walls were laid up full six feet high. A stone chimney was in one end, and near the other end were two windows of nine lights of 7x9 glass. For thorough ventilation no modern architecture has improved upon that structure. There was no ceiling or floor overhead, and no care for a tight roof.

You have all heard of "the cold seasons," one in particular, 1816, I was here and know all about that. The birds were so cold some days that I could catch them with my hands, and many pretty ones died. I knew some people who went to Ohio then; others would have gone if they had teams and things to go with. Some large boys set traps for fur animals, and men killed bears when they came for the corn or sheep. Some boys were hunting and fishing most all the time. Some of the men hunted bears and other animals. My father killed the foxes when he saw them come for the geese. I saw my father set his gun in the cornfield so that a bear fired it off himself and was killed. Boys who had to work did not have many play-days beside the Fourth of July and trainings and muster. My father was captain then, and all his company lived in Foxcroft and where Dover town is now. I saw the men training. More companies helped to make the muster. Mr. Towne had a large field and no stumps on it. Mr. Towne was one of the officers in my father's company. Some men always came to our house on muster days before it was light, and they fired awful loud guns, and then my father would ask them to come in; and then they drank something that was in the kegs that father had filled at Bangor in the winter. And they had sugar that came from Bangor.

What I have indulged in saying, is directly in the line of that sentiment which binds each of us in loyal affection to our birthplace—to the home and haunts of our childhood—binds us to the lands amended by the industry of our ancestors—lands improved by their wisely directed labor from the condition in which they found them in this unfinished world;—in the line of that sentiment which binds us to our country and our fellowman. Under favorable conditions this sentiment gains strength with our increase of years, and at times we may advert to early experiences with profit.

The settlement within the present limits of this county was effected in the first years of this century, and twelve of its townships were entered upon at nearly the same time. The census of 1810 gives Foxcroft sixty-five inhabitants. This number was exceeded in six other townships. These people coming from the older settlements, missed the fruits to which they had been accustomed, and took immediate steps to supply themselves. A few apple trees were brought in, but most people waited till supplied from the seeds they had brought with them. My father started with both methods. He brought a few trees from Garland, and they were destroyed the year they were set, by grasshoppers eating away all the growth of the year. I remember the stumps of those trees—some of them having feeble sprouts from the root. These trees were probably set in 1810, and his nursery started the same year. Some of the nursery, after four years' growth, was ingrafted by my father with scions brought by him from his former home in Massachusetts in 1814. Some of these grafted trees remained where planted, so that we soon had good apples from them. I feel quite safe to claim this as the first grafting done in this county.

Mr. John Hart, who moved his family to Atkinson from the town of Penobscot in 1815, obtained a few grafted trees at Garland, but they did not come to bearing before he had apples from the seeds he planted. Planting seeds in all these towns was probably done as early as these cases named. A seed planted in Abbot by Mrs. Huston before 1810, produced the Rolfe apple.

In 1820, Oliver Crosby, Esq., came from New Hampshire, and commenced farming at Atkinson on a larger scale than before seen here. Salmon and Cyrus Holmes came from Hebron to Foxcroft at about the same time.

Mr. Crosby started good apples soon, as some of the older trees there are now bearing the "Canada Red." Capt. Salmon Holmes did some grafting on his farm before 1830. Mr. A. Jackson in Sangerville and Mr. McClure in Sebec had grafted fruit that must have been started as early as the work of Crosby and Holmes. To show how I gained and retained my interest in fruit, I must here give some account of my movements. I worked with my father a part of each year from 1831 to 1836 inclusive. In that time I had seen some of our country from Eastern Maine to Connecticut. For a time I was employed so as to visit the most of the farms in the then Kennebec county from Farmington and Temple to Readfield and Winthrop. In these short journeys I gave special attention to orchards and their treatment. In June, 1838, my father, by an accident, was removed from the primary school of earth life, leaving directions for me to occupy his place on the farm for the next thirteen years. This event called me from Michigan where I had entered on a life-work of making a farm in another wilderness. The old farm at that time had several acres of orchard, and a row of trees was set by long lines of stonewall. My father's grafting had not extended much beyond 100 trees. The other trees bore a good class of fruit, coming as they did from seeds saved from the grafted fruit first produced. I saw little value in such orchards. A few good apples could be sold in Bangor in winter; but of the main crop I could sometimes sell a load at harvest time, sixteen bushels for a dollar. I tried the Bangor market for cider. and soon tired of storing it in cellar to be hauled in winter. Our cider mill, an accommodation affair, was crowded with work two months in the season. It took me only two years to ripen a disgust for poor apples, and to form the resolution to abate a nuisance, put a new head on the trees or cut them away. I set about qualifying for the first method. I had seen some successful work done in changing the tops of well grown trees, and had seen other trees assaulted and ruined by ignorant wood-butchers trying to do the same thing. I had seen my father change a top, working by his slow method of setting scions and enclosing them in a ball of clay. In later years, elsewhere, I had seen where wax had been used, and evidence of rapid method of working. I went to Winthrop and interviewed Moses B. Sears, then extensively engaged in this work. I found him on a winter day, genial and full to overflow at all points of my inquiry. He had no secrets in his business. He took me over the whole field—how and when to cut scions; how to preserve them; how to make wax to use in cool or hot weather; talked about an outfit for the business; about choice of trees, giving promise of returning the cost of the change; how to cut the tree, avoiding the removal of a branch, leaving a cut that could not be covered by the subsequent growth; how to locate the scions, giving proper room to each, to utilize the whole top and do it with the least possible number of scions. With this practical lesson joined to my previous observation, I took up the work with confidence. I bought the fruit books then published in this country. I obtained scions of varieties not then known here. I prepared for and set about 2000 scions in the spring of 1841. Having good success with these, I made a larger job the next year. This work attracted attention, and I had calls to work for others. The demand for grafting grew to a clamor, and I joined with my brother, Luther, and we made large operations in nearly all the towns of the county. After I left this intinerancy, my brother and James, son of Cyrus Holmes, continued the work several years.

While in this work I had opportunity to learn all there was of local fruit history to that date. I worked and talked for fruit, instructed men and boys in the ways of pruning and grafting, and never left a job without teaching the owner as to the care of the trees, pointing to the larger branches that should not remain beyond the next year. I emphasize the fact that the successful change of a top is by a gradual process. Cases often occur where it is proper to do this, but changing old tops is not to be encouraged when it is easy to get a young tree to take the place of an old one. When my care of the farm ended, in 1851, I came to my present home, having then twenty acres—only five with any improvements, and these of rude character. I came here in November and then put in cellar 3000 seedling apple trees, and grafted them in winter by the kitchen fire. I set these as a start for a nursery; and brought one hundred grafted trees from the farm for an orchard. I increased my nursery in the three following years to about 10,000 trees. In that time I started seedling pears and grafted five hundred of them in winter. They started growth in the cellar before they could be set. Some very hot days following the setting, nearly all were killed. I had not provided shade for them.

I see no impropriety in showing here the untoward surroundings that menaced my work. While setting my nursery in the spring of 1852, two prominent citizens came and looked on my work with apparent curiosity. One ventured the remark, "You will have to fence round these trees to save them." I replied: A fence will cause the snow to drift and spoil them. "But the cattle will be on the field part of the year." To that I replied: They will not be on *my* field. Then came the remark: "You will see," and they joined in a hearty laugh. I had seen the custom of the place. Animals had the run of the roads at all times. After the harvest, all boundary fences would somehow get opened and all cattle made common pillage till the next planting time. At that time my daily talk was for gardens and fruit. I saw my interest and safety lay in inducing my neighbor to grow his family supply on his own land. My talk for fruit was met by one terse expression which must have been adopted by unanimous vote of all citizens, as all gave it in the same words—"It is no use to raise fruit, the boys will steal it all!" Why men, claiming leadership in morality and public virtue, had accepted such a motto remains a mystery to me. Boys grew to manhood while hearing that repeated. But this represents a condition of forty years ago. This is claimed as an age of progress, and we have seen improvement in some directions. My nursery was by the public road and advertised itself. The prospect for sales was good. A hard winter set its mark on some varieties, and a nursery will catch drifting snow. I began to move the trees to the brush heap. A few years later saw the last of that nursery turned to ashes. I never was paid ten cents a day for the time I had given it.

After my experience, nursery business tempted several others. Captain Webber of Guilford, H. L. Leland of Sangerville, and other good farmers raised trees to supply themselves and neighbors.

I must leave the "Progress of Orcharding" in the *way back*, as I have myself become a "back number." I stocked my small place early and hurriedly for fruit and shade, and little room was left for additions, and I have had little time for experiments—have not taken many of the apples claiming attention.

PEARS.

Very few pear trees were in the county at the time I was grafting. I had scions, but seldom a call to set them.

On my new place I started but few varieties. Of these, the Flemish Beauty gave best results. The trees made good growth and soon gave large crops of fair fruit at a time when it was generally being discarded by reason of its cracking. The tree was weak and subject to early decay at the branching point; and in subsequent years several trees went down with an overload of fruit. I set several dwarf trees, and deep snows soon destroyed them. There is no apparent reason why pears may not be grown here to a home supply. Pears brought to this village are mostly from the near towns in Penobscot county. My experience with pear trees handled by the trade is, they prove false to the attached label in most cases.

PLUMS.

This fruit received early attention. The native "Canada Red" and other better ones of various colors were quite common when the first apples appeared. The ease of obtaining the trees by their habit of suckering, and from their early production when grown from seed, favored their early appearance at most homes—they circulated without price. One of the best was white and very late in season, answering well to "White Damson" of Downing. One of dark color, (the "Wheat Plum"—called by some who liked to have things named) was very good and productive.

Three trees of last named had been set on my place by prior occupant and were well started in 1851. When matured, the three trees gave me one crop of six bushels. My success with this fruit for several years was all that could be desired. When plums were at their best with me, Hon. A. W. Paine, one of Bangor's enthusiasts, called on me opportunely, and with book in hand spent several hours identifying varieties to his own apparent pleasure, and certainly to my satisfaction in the proof that I had gathered about twenty standing well up in the named list, and lead by a good number of trees of Green Gage and McLaughlin. But the spoiler came! Black-knot speedily wiped out my picture.

CHERRIES.

Cherries appeared here nearly as early as plums. I had known one variety many years before seeing others—the very common Kentish. Some of these were set on my place a year or two before it came to me. To these I added a few trees of the Heart and the Duke classes. My collection had short time to prove their adaptability to the place, or to manifest homesickness. They sympathized kindly with their friends—the plums—in their affliction and finally made common cause in that unfortunate exodus. All other fruits common to the south half of the State have been tried here, and many citizens can speak of them from experience. I have tried about all that the climate favors, and certainly have tried some that it didn't.

In regard to the climate and the fruits it may favor, nothing need be added to what your past reports contain. It may be of interest to know with what certainty the apple crop comes to us. I have more than once been to western New York in autumn when scarcely a bushel of fair apples could be seen out of Maine. I have been here to see every apple crop, except that of 1837, since my father's first grafted trees came on, and can say there has not been a skip in all the time since when we have not had some of the varieties he then introduced. I feel safe in this statement as regards the Hubbardston. There have been a few light crops, but not a time when good apples could not be had at reasonable price. We have had occasional damage by hail on small areas; and some by neglect lost a crop by the tent caterpillar. In regard to untimely frosts we have been specially favored.

Vegetation is held well back in spring by the deep snows and the ice of the lakes, and hard autumn frosts are with-held by causes that are not so apparent. Many times the crops here have escaped, when in nearly all of the East and Middle States there has been great loss. Last season we had only very slight frosts before November, while Vermont and Connecticut had been reporting hard frost and snow.

While I have the floor I will add a quotation I have once seen aptly applied on a similar occasion, that is good enough to bear repeating here. It is the last advice of the old Laird of Dumbiedikes, and has been made of enduring record by Scott: "Jock, when ye hae naething else to do, ye may be aye sticking in a tree; it will be growing, Jock, when ye're sleeping."

CONDITION AND PROSPECTS OF FRUIT CULTURE IN PISCATAQUIS COUNTY.

By H. L. LELAND, East Sangerville.

I wish first to say a few words with regard to Brother Chamberlain, who sits upon the stand. Had Brother Chamberlain left himself out of orcharding in Piscataquis county then fruit culture might have been left out,—there would have been but little left. We sometimes hear it said that the play of Hamlet without Hamlet would contain but very little. I wish to say that for whatever we have done in this county in fruit culture we are very largely under obligations to our friend, Mr. Chamberlain, who has been the leader of fruit culture in Piscataquis county, and has practiced what you have heard spoken of here to-day. He has made a practical test of fruits,—has brought them here and introduced them, not only apple and pear trees but the smaller fruits; so that if any of us farmers wanted a few currant or gooseberry bushes, or a grape vine, we would go to Mr. Chamberlain's place to get them, and with them we always got a good deal of good advice in regard to planting and caring for them; and so in our county here, we that are some younger than he, but we have for him the utmost respect, and are proud that he is with us to-day and has written for us this excellent paper. It is a correct, concise history of fruit raising and growing in Piscataquis county down to the time when he partially dropped out of the work. Now, if I am to continue that history and show you how we are situated in regard to fruit growing to-day, I shall have to ask you to use my eyes. I wish we might regard it a pleasant day in June, and ride over these hills and valleys, up and down the length of Piscataquis county; we could see very quickly what the condition of fruit culture here is to-day. But if you will take the picture from me, I will attempt to present it to you as concisely as I can. Our fruit culture in Piscataquis county is a good deal mixed. We have to-day those old orchards planted by the pioneers. I have been astonished as I have passed through this county from east to west and from north to south, to see that almost every one of the pioneer farmers planted large orchards. They came from Oxford county, New Hampshire, and other places where they were accustomed to have plenty of fruit, and one of the first things they did was to plant apple seeds and raise nursery stock.

This was done in every town, and these old orchards remain until this day. Many of them have been scarred with the tooth of time, but they yet remain, and if you ride over these hills you will see them, not only on farms now occupied, but on farm after farm, and what has been home after home you will see apple trees growing among the spruces, cedars and hard wood growth; and you will wonder how these old broken trees came here, still showing evidence of life, expanding their limbs to the breeze and getting what they can of mother earth though crowded and hidden by these forest trees. And possibly at the season of the year when you see the apple blossoms you will see among brambles and briers a rose in bloom and a few flowers of the hardier sort. You will see where once a garden smiled, and still many a garden flower grows wild.

These abandoned places were the homes of thrifty families many years ago. They took up nearly all of these lands and raised large families; but these boys and girls discovered that after the land had been cleared, it was extremely rocky and hard, and they have sought for better fields; and we find them in our villages and in the West, but not on these old farms.

I wish to say in regard to the New York trees of which Brother Chamberlain spoke, that I rescued a few of those trees from the brush heap. He has forgotten that I took from his nursery several hundred trees and planted them, and have to-day a very fine orchard.

Many of these New York trees were brought in by the tree vender, who came with his picture book and wonderful trees, and every one took trees; and as they were told that they could plant them on any rocky ground,—the more stones the better,—they would select some old, rocky field, as the cattle would destroy them in the pastures, and make a hole and stick them in. I think the result is very evident. In the fall of the year the cattle had the range of the whole farm and if these trees started at all the stock would of course destroy them; or if any escaped, the winter snow and ice would use them up. The next year more trees would be wanted, and the venders would come around with a hardier variety, and so it went on. The farmers were continually buying trees, and the trees were continually going out; money going out and the trees going out with it, so that an orchard of New York trees in Piscataquis county that is of any age is very rare. It is an exception, although you will find a few of these trees. In recent years better trees have come in from the West, or if not better trees better care has been given them, and we are getting now some young orchards that are well cared for and show that they are going to be profitable. But our best orchards are from home grown trees. Quite a number of men from different parts of the county have been in this business somewhat.

That is about the condition of our orcharding in Piscataquis county to-day. We have still these old trees which ought to be cut down and gotten out of the way. Why they are allowed to encumber the ground I know not, unless it is on account of the veneration we feel for them. I know that I felt badly when I saw the trees being cut down in the orchard which my grandfather planted, near the place where I lived. We did not as boys have fruit on our farm, but I remember we always got some amongst the other trees somehow. It was supposed that boys forty years ago would get apples if they were very apple hungry; but it is not supposed so now,—there has been a great improvement in boys.

Last summer Prof. Munson sent out from the college a bulletin of varieties of fruit adapted to different sections of the State. I had a bulletin at the time, but have mislaid it, and shall have to quote from memory. I was reading that bulletin one day, I think it was Sunday. I was alone in the kitchen,—my family were in the sitting-room. In reading that I made some noise, I think I smiled out loud, and my wife came out to find out what was amusing me. I said "One of those college chaps has issued a bulletin about fruits in Piscataquis county." I think among the varieties mentioned were several of the stern iron-clads of the rigid North somewhere,—I do not know where they are good,—but not one of the standard varieties. The fruit exhibited on the third table was all raised in Piscataquis county, and we are showing it under the most disadvantageous circumstances that we have ever showed fruit. We have sold our finest fruit, without thinking of saving it for this meeting. But if you examine our fruit you will find all the standard varieties that you find in any part of the State; though I will admit that several of those varieties are not a first-class apple in Piscataquis county, among them the Baldwin. I am not going to say we do not raise Baldwins, but I will admit that we do not raise such Baldwins as I see in Kennebec and Franklin counties, and farther south. I have never had a tree of any kind winter kill and I have had all varieties. In our climate we can grow all the varieties, but the Baldwin is not what we suppose it to be in the southern part of the State. It may be that we have not given it the care that we ought. We have been very remiss in not giving our trees proper care. We put them out anywhere and expect them to take care of themselves. We have been more negligent in that respect than you who are farther south of us, but we are doing better work than ever before. If a cow is tied to a stake she will starve in a short time; a tree is tied and has got to be fed or it will starve to death.

It is sometimes supposed that we are away up in the frigid zone. I remember that Brother Knowlton and myself some years ago were being driven from Presque Isle toward the Northwest, and it was an exceedingly cold day. I said to the driver "this is fearful." He said, "the North Pole is just up here." And I thought we had got pretty well up toward the North Pole; but we in Piscataquis county are not there. To illustrate our climatic condition, as compared with that farther south by what is planted here; twenty-five years ago next August the Board of Agriculture held its first meeting in Piscataquis county. It was then a condition imposed on the Board that an annual meeting should be held in close proximity to the State College, and that the faculty and students of the college should be in attendance. We considered this close proximity, and the meeting was held here, the faculty and students being present.

Brother Chamberlain invited the Board, and especially the students, to visit his place up here on Main street. It was then in its prime; his gardens, fruit orchards and grapes were then in a condition to be shown. Mr. Goodale in extending this invitation made these remarks: "Before the commencement of the regular exercises of the afternoon I desire to offer a single suggestion to the students present. Mr. Chamberlain has invited you to visit his grounds, and you will doubtless embrace some opportunity to do so."

Now there is a wide difference between barely looking at objects, and carefully observing them. The one may be of little profit; the other may be highly instructive. If you notice with care you will see many trees, shrubs and plants which are not indigenous to this section and which are rarely grown here; you will find several nut-bearing trees as the hickory and chestnut, several rare kinds of oaks, black walnut and various others; and you can learn the various degrees of care for each under the conditions of soil, climate, etc. And so with the fruits; I was forcibly struck with what I there learned regarding grapes. This place is 100 to 150 miles north of the place where I reside, and you would naturally expect to find the fruit later; but such I find is not the case, but the contrary." That shows something in regard to our climate, and Mr. Goodale is a man who never speaks at random.

DISCUSSION.

Ques. Will you please tell us which varieties do the best here?

Ans. I simply claim that we do grow all the standard apples, possibly excepting the Baldwin and possibly the Northern Spy, that are grown in the State. And I think there is no difficulty with the Northern Spy, if we properly enrich the ground; and possibly not with the Baldwin, though I do think we are out of the Baldwin region. We grow all the fall varieties, and we can grow as good Nodheads and Hubbardstons as I have seen grown under the sun; as good Porters, Somersets and Greenings, including Rhode Island Greenings.

Some years ago Brother Chamberlain introduced here the Hurlbut. I got a tree, supposing it to be a good apple, because I knew Brother Chamberlain would never adopt anything unless he knew all there was to be known about it at the time. I liked the growth of the tree exceedingly well; and I can say that so far as I know it is one of the most productive apples we grow. It is an apple that is salable and the quality is good. There is only one fault, it must go before January or there will be considerable loss. It is about with the Nonsuch. We have now an apple, the Milding, which came to me recommended by Mr. Gilbert. I had confidence in him and grafted quite extensively; and I must say that in my experience I have found nothing that suits me anywhere nearly as well for a winter fruit as the Milding. Nothing equals it as a pie apple.

Ques. What variety takes the place of the Baldwin?

Ans. We have been hunting for a substitute for the Baldwin for the last twenty years; and I believe the Milding will take its place. It grows large and handsome and is an exceedingly productive bearer. The tree is thrifty and the apple smooth and of large size. I have kept the Milding until April or May.. We grow the King here also. It is a handsome apple but a shy bearer.

Prof. MUNSON—I would not give a cent for a man who could not laugh, and I am very glad indeed that I gave Mr. Leland some source of amusement. I am very, very sorry that we have not a copy of the bulletin here but if I remember rightly the list which I gave is headed for northern Piscataquis, Penobscot and Washington counties. I am very glad indeed that in Dover and Foxcroft you can grow these apples, but in the northern part of the county you cannot grow them. At Patten and at Sherman we cannot grow these apples. The list must be tentative; but in the northern part of the county we cannot grow the same varieties that we can in the southern parts.

The Dudley's Winter is *the* apple for Aroostook county. It is a seedling of the Duchess and is in prime in January and February, but may be kept until the first of April. It is as hardy as the Duchess, and I consider it a very satisfactory variety for Piscataquis county. In this part of the county it would probably be in prime about December or early in January. It is being sent out by Chase Brothers as North Star. It is very unfortunate that that name should be applied to it, as there is another variety grown in Iowa which has the right of the name.

I am glad that the point has been brought to our attention that there are varieties which can be grown here which cannot be grown in the northern part of the county. I think Mr. Leland will agree with me that many of these varieties which he can grow here at Dover will not succeed in Monson. I have friends at Monson who have told me some of their experiences in attempting some of these standard varieties, and their work was attended with very disastrous results. I think there is no misunderstanding if we take into account the extent of the county,—it is long north and south.

THE MODEL FRUIT GARDEN.

By J. F. Norris, Foxcroft.

First, why should every farmer have a fruit garden? Because a generous supply of it is necessary to the health of his family. Give the children all the well-ripened fruit they need and discharge the doctors with their ghastly list of mineral drugs.

It is beginning to be found also, that fruits are even more needful to the aged. Medical science tells us that chalky deposits in our bodies bring sluggish circulation of the blood, make brittle bones, shrunken limbs and the tottering steps of wrinkled age. Fruits do not contain these chalky ingredients, and could we rheumatic and crippled farmers substitute largely for hard water and hard meats, also for bread stuffs, fruits and their unfermented juices, we might put off the evil day of hoary decrepitude. The farmer who neglects to raise fruits, neglects the most important item in his own diet.

No doubt it was the model fruit garden into which the Creator put Adam and Eve; and the antidiluvians lived each a thousand years because they used a fruit diet.

Let us have the model fruit garden because it will add to the attraction of farm life, and will increase also the money value of the farm more than any other improvement we can make with a small outlay of time and money.

OUR SHORT SEASONS

are not unfavorable to the small fruits. The strawberry, currant, gooseberry, blackberry, raspberry, are indigenous to and abound in the forests far to the north of us, and this is true also of the cherry, plum and apple. We have less insect enemies here in northern Maine for small fruits than south and west, and the great enemy, both of small fruits and stone fruits—severe summer drouths, which in the South, Northeast, Middle and Western states is making the fruit crop increasingly uncertain, does not trouble us here. Our deep snows help us also in giving us protection.

Suppose you devote one-half acre to your model fruit garden, you will be surprised at the long list of large and small fruits you can grow on it, and yet give them very ample room.

BILL OF DETAILS.

Strawberries, 260 hills, two plants to a hill—520 plants at three-fourths cent, $3.90; 37 grapes at 20 cents, $7.40; rhubarb, 7 hills at 8 cents, $ 56; black raspberries, 30 at 5—$1.80; gooseberries, 54 at 8—$4.32; blackberries, 73 at 5—$3.64; total, $26.39.

Apple trees, 40 at 20 cents, $8.00; pear, 27 at 30—$8.10; cherry, 27 at 30—$8.10; plum, 30 at 30—$9.00; total, $33.20, added to the small fruit list, making $59.58.

The strip of ground might be twice as long as wide—180 feet north and south and ninety feet wide. This will give seven main rows for the large fruit trees running north and south to secure sunlight on both sides; four rows of apple trees thirty feet apart each way; between these three rows pears same distance apart standing quincunx order to the apple trees. Between the apple and pears go the cherry and plums, and in this fifteen feet space go the currants, gooseberries, etc.

CHOICE OF VARIETIES.

The aim should be for good quality for the family table, hardiness, productiveness, and succession in ripening.

Strawberry.—Early Michel, Lovett's Early, Crescent, Parker Earle.

Raspberry.—Thompson's Extra Early, Golden Queen, Cuthbert, Shaffer, Olden.

Grape.—Moore's Early, Moore's Diamond, Moyer, Delaware, Green Mountain.

Rhubarb.—Strawberry.

Gooseberry.—Downing, Red Jacket.

Currant.—Red, Cherry, White Grape, Fay.

Blackberry.—Wilson's Early.

Apples.—Two each of Yellow Transparent, Red Astrachan, High-top Sweet, Sweet Bough, Porter, Rolfe, Hurlburt, R. I. Greening, Fameuse, Yellow Bellflower, Jersey Greening, Ben Davis, Crab, Talman Sweet, six Milding, three Duchess, three Somerset.

Pears.—Idaho, Wilder, Krull, Bessimianka.

Cherry.—Early Richmond, Ostheimer, Abesse, Suda, Montmorency, Dyehouse.

Plums.—Red June, Burbank, Abundance, Satsuma.

MATERIALIZING THE MODEL GARDEN.

Mr. Norris said he had no doubt but enough had been lost in Piscataquis county in trees badly bought, badly selected and badly cared for to have secured, if rightly managed, a good fruit garden on every farm.

Don't buy of an agent. He is likely to give you, for an enormous price, poor stock, in bad condition, untrue to name. Go yourself to the grower and see that the stock is vigorous, well-sorted and shapely. This one can do for the small fruits.

If you must get your tree from abroad send directly to a good nurseryman or get a friend to do this for you. If several club their orders bottom prices can be obtained.

Have the garden convenient to the house. Cultivate as much as possible with horse and proper tools. If the site has elevation enough for good water and air drainage there will be but little trouble from winter-killing. If the site is low, confine yourself to iron-clad apple and pears and give winter protection to everything else. If the soil is unduly moist, underdrain.

Most of the upland soils of the Piscataquis valley are favorable for a good garden. I get, however, my best strawberries and other small fruits on clay loam, naturally wet but thoroughly underdrained, and stirred every two or three years with a subsoil plow. Such soils are preferable for plums and pears, but cherries and grapes do better on dryer soils.

SETTING TREES AND PLANTS.

Have the soil mellow enough and rich enough for heaviest crops of sweet corn. Have the land harrowed fine and smooth. Run a marker the longest way marking rows seven and one-half feet apart, perfectly straight; in these marks run the furrowing plow. Set the marker teeth three feet nine inches apart and mark across the furrows. Set up stakes (laths) in the apple and pear rows, not setting them where the trees are to go in, then as you put in your trees you can get them in perfectly straight line by sighting past the stakes.

Trees should not be exposed to the sun or wind neither bruised nor dried.

Make the holes large enough to take in the roots without cramping, deep enough to set stems three or more inches under ground.

Have nice, mellow soil under the roots; work rich soil—not manure—among the roots and pound it in firmly, filling all air spaces; let the long roots reach towards the west and the tree lean slightly towards the 2 o'clock sun. Throw some loose soil over the hard pounded earth that holds the roots and the little job is done.

STRAWBERRY PLANTS.

Never expose the roots to the sun. Handle them with plenty of earth clinging to the roots if you can. If the roots are bare of earth, carry the plants in a vessel containing a little water to keep the roots wet, and set out directly from the vessel, spread the roots well and press mellow soil firmly upon them and covering the crown of the plant—two plants go into each hill.

Grapes, currants, gooseberries, raspberries and blackberries, should all be planted deep enough, so that the cultivator will not readily tear them out, all of these are hardy except the black cap raspberry, and are not difficult to make live.

IN CULTIVATING,

stir the ground once a week by running the cultivator both ways; clean off the rows by hand hoe. Practice clean culture and carry the habit over to all cultivated crops.

Broken roots and limbs, and limbs not needed for a shapely top, smoothly cut away. The remaining cut back more or less according as the roots are many or few, but do not trim to a bean pole. Watch the trees as they grow and pinch all buds and sprouts not needed for a shapely top.

When setting grape vines cut back to three buds, as they grow rub off the two weaker, thus train to one wire the first year.

WINTER PROTECTION.

The currant and gooseberry do not need it, even in Alaska, but we must not forget that both need summer protection against the currant worm. Dusting the damp leaves with hellebore is a good remedy.

The strawberry is also an Arctic plant. It gets on well here under our snows, and a covering in fall of seedless stable manure or evergreen boughs only, that makes the crop sure and abundant.

The raspberry and blackberry give a sure crop only when laid under the snow. Mr. Norris said his plan for protecting his raspberry vines was for two men to take a heavy rail and place against the row of vines and press them over towards the east, letting the rail lie upon the canes to hold them down; and so proceed till the end of the row. The ridge made by the rounded over vines and rail holds the snow which drifts over them and makes ample protection for winter. In April when the sun lifts the snow robe, remove the rail and the vines rise as upright as ever. The crop never fails.

The Black Caps are tied to stake five feet high—in the fall the old canes are cut out and the new ones laid together near the stake and covered with soil to hold them in place.

Grape vines are trained to stakes ten feet high. After harvest cut the laterals all back to two buds; place the trimmed vines in a coil about the stakes and cover with soil.

Our strawberries run out in three or four years; the blackberries and raspberries in eight or ten; but the currant and gooseberry, trained on the renewal system, will last as long as the apple trees.

The garden must be liberally dressed with seedless manure every winter, and twelve or more bushels of ashes all over it each summer.

PICKING.

Excepting the pear, let all your fruits get tree ripe before picking. Much of the strawberry crop in this region is picked too soon, is therefore sour, insipid and unwholesome. The blackberry also, is delicious only when fully ripe.

Watch all the larger fruits to catch them at the points of ripeness, then revel in the best of food God has given to man.

DISCUSSION.

Ques. What variety of blackberry do you raise?

Ans. The Early Wilson. It is a slender kind that will turn down without breaking, is the most prolific of any, bears every year and will hold up great masses of fruit if you give it protection.

Ques. Is the Shaffer raspberry hardy here?

Ans. It is, if you put it down; but perhaps the Shaffer would not be profitable with you. Most of the black raspberries are failures because but few will ripen, and the rest will dry up and not come to perfection.

Prof. Munson—I think the matter of laying down plants is a very important one, and one which need not be a cause for so much fear as is evinced by many; but in our deep snows is it always advisable to lay our plants to the east for the sake of getting the west winds? We find there is a tendency with the deep snow to flow down hill just as there is with water, and my practice is to lay them in the direction of the slope rather than against it so that the snow may work down over them.

Another point which I want to bring out is in the care of some of these trees that we get through our tree agents. Many times good trees have been carted around the country for hours, and I do not know but I may say for days at a time, until they are not fit to set Many times such a tree as that may be saved if you will put it right into the ground,—bury it root and top—and leave it for a week. Moisture will gradually be taken up and the tree may be saved by giving it that treatment, whereas if we set it immediately in the ground it will be lost every time.

The Japanese plums are not sufficiently tested in this State to warrant our placing our whole reliance on them. They have been fruited to a very limited extent, and they are very attractive in appearance; but for the general use of the farm, for the farmer's home garden, I think we cannot place full dependence on the Japanese plums. The varieties which have been named are the best of that class,—the Burbank, the Abundance and possibly the Willard; but we want some hardier sorts. The Lombard is everybody's plum; anybody and everybody can grow the Lombard. And another plum which is of superlative quality is the McLaughlin. We know that is hardy and it is one of the best plums that is grown for home use; and the Bradshaw is always good. I should advise planting some of these hardier varieties which have been well tested, for main dependence.

Ques. Will you not include the Moore's Arctic for the farmer?

Ans. Yes; the Moore's Arctic is a very good plum for canning and is very hardy. Perhaps I would include that for those who do not exercise the care necessary to grow some of the more valuable sorts, but it is decidedly second rate in quality.

I also wanted to speak of the matter of gooseberries. The Red Jacket gooseberry is a new thing and we will have to pay $3.00 per dozen for the plants, and I should not advise making that the leading variety of gooseberry. We have the Downing, which is one of the most satisfactory varieties of the native type; and if we want an English gooseberry we know that the Whitesmith has been well tested and is one of the most satisfactory of the English type, far superior in my estimation to the Industry.

Ques. Would you not add the Reine Claude to the list of plums?

Ans. It is one of the very best. It is a short lived tree and just a little inclined to be tender, but a very satisfactory plum.

Mr. NORRIS—I had those varieties of plums mentioned, the Lombard, McLaughlin, Bradshaw, etc., and supposed they were tough enough to stand the winter, so I let them stand up, but every one of them killed back to the stump. I find if I put them down, as I do the Japanese plums, they do just the same,—come up all right in the spring.

Prof. MUNSON—Most of the farmers in this vicinity would be situated so that they could grow the trees without laying them down. But they would not be able to grow the Japanese without laying them down where they would be able to grow the domestic trees. The Japanese sorts are not sufficiently tried so that we can depend upon them and you have got to give them a great deal more care than you do these hardy, vigorous, well tried sorts.

Mr. KNOWLTON—I wish to mention a variety of blackberries which the speaker omitted and which is grown in a large part of the State more successfully than any other; I refer to the Snyder.

In quali y it may not be quite as good as the one the gentleman speaks of, but it comes pretty near being thoroughly hardy. I have had my bushes growing twelve or thirteen years, and with the exception of one year I have always had as many blackberries as we wanted and could expect from those bushes. In other words they have been so thoroughly hardy that without the slightest protection they have borne ten out of twelve years. I do not say that to say anything against burying the canes in the winter if any one wishes; but I have a feeling that here in most parts of Maine it is not necessary to do this with the Snyder as a rule. The Snyder berry is one of the best in quality, and the ease and certainty with which we can raise it makes it really one of the best.

Mr. NORRIS—I had a row of Snyders which I let stand up and another row which I turned down. From the row which I turned down I got a wonderful crop, but from the other row not a berry.

A DISCUSSION AS TO WHAT SHALL BE MAINE'S FLOWER IN THE NATIONAL GARLAND.

By JANET L. DINGLEY, Auburn, Chairman of the Maine Floral Emblem Society.

All the countries of Europe, in fact all the nations of the civilized world, have their national flowers. They have originated for the most part either in legend or in war. The mignonette, the emblem of Saxony, is founded on romance. The English rose is immortalized by thirty years of war. The shamrock of Ireland is grown out of religious mystery: "How can three be one?" asks the pagan Irish chief. "Even as the trefoil," answered St. Patrick, plucking a shamrock at his feet, and Ireland had a floral emblem from the suffrage of heaven.

The prick of the thistle once caused a cry in a party of attacking Danes, and thus saved the Scots from slaughter at the hands of midnight marauders. The French fleur-de-lis has been the emblem of France ever since a wonderful dream of one of the earliest kings of that country. Every traveler in the Alps will admit the peculiar appropriateness with which the edelweiss typifies Switzerland.

The national floral emblem of the United States cannot be founded on traditions, for we have no national myths. It would not be appropriate to consult the annals of war, for we are preëminently a nation of peace. No striking event in our history proclaims the fitness of any one flower. The struggle for life of the early settlers and the struggle for money of the present generation have given us small leisure to agitate a theme which peculiarly concerns sentiment.

For upwards of ten years unorganized movements have been made in different parts of the country looking to the selection of a national flower. One band in the South suggests that our flower be emblematic of our industrial life, and proposes the cotton as our emblem. The farmers of the West suggest the corn as emblematic of agricultural life. However, it is thought by most that by a garland the spirit and idea of our federation will be best expressed. It concerns Maine, therefore, to select her emblem to form a part of this garland.

The first thoroughly organized attempt by popular choice to secure a national floral emblem appropriate to the United States originated at the Congress of Women in Chicago during the World's Fair. Since our country is so vast, our interests so diverse and our climate so varied, it was proposed that our national floral emblem take the form of a garland composed of as many flowers as there are states, these to be chosen by the popular vote of each state and legalized by the different state legislatures, and then presented to the national congress for final ratification. The plan was enthusiastically adopted and endorsed by Mrs. President Cleveland, Senator and Mrs. Frye, Mrs. Garfield, Mrs. U. S. Grant, Congressman and Mrs. Dingley, Governor Cleaves, Mrs. Robert E. Lee, Mrs. Jefferson Davis, and hosts of others in our country. The movement was thoroughly organized last year and some states have already chosen state flowers. Vermont the red clover, Iowa the Indian corn, California the poppy, Wyoming the sunflower, and so on.

The Maine Floral Emblem Society has been engaged the past six months in bringing the selection of a State floral emblem before our people, who have not forgotten the beautiful object lesson supplied in the recent procession and battle of flowers at the September meeting of the Maine State Agricultural Society. On November 24th the ballot was opened to the State. The voting is being conducted through organizations like the Maine State Grange, the Sons and Daughters of Maine in other States, and the Women's Federation, and through the newspapers, which, with patriotic appreciation, have published a blank ballot. No reader of Maine's newspapers need be ignorant of how and when to vote. It is not my desire to influence, but only to inform my hearers, so I present the arguments for the various candidates proposed just as I hear them.

It has been argued by some that the pine cone and tassel constitute the natural emblem of the State in both an historic and a poetic sense. Those who antagonize the adoption of the pine cone, say that the pine cone is not a flower. The lovers of the pine can appeal to precedent, for neither is the shamrock a flower, yet it is sacred to the Irish nationality. Botany must surrender some points to history, and selecting anything but the pine might give us two emblems afield, thus imperiling our identity without enriching our nosegay. The pine cone is indelibly connected with the history of our country, for it was emblazoned on the first flag which ever represented the United States. However, the pine is fast disappearing from our Maine forests, although it is to be hoped that arbor culture may in the future revive our pine forests. But we are the Pine Tree State for all of that. It is also urged that the pine cone would be more effective in a garland because of the variety and beauty it would contribute thereto.

The critics of the golden rod call it a weed, and the farmers doubtless prefer to see it in a garland rather than in their fields. Moreover, its opponents affirm that the separate petals of the golden rod are too minute, and have little distinctive character, so that the flower might become a shapeless mass in the hands of an engraver.

Since the national garland should lend itself effectively to art, it is urged that the pine cone can be treated far more effectively by engraving than the fine petals of the golden rod. But the champions of the golden rod assert that it is the most universal, permanent and beautiful of our way-side flowers, and that all things are weeds when they are in our way.

There are many advocates of the apple blossom, but the flower, though beautiful, lasts but for a day. The apple blossom would obviously add beauty to the national garland, and certainly it would be more available in art than the golden rod.

The advocates of the pine cone urge that the cone and tassel would be the most appropriate emblem for Maine, historically speaking. Others affirm that the apple blossom would unite in a singular degree the felicities of beauty and utility; while, in their turn, the champions of the golden rod say that this lovely way-side flower appeals exclusively to the æsthetic sentiments, which are those that should be predominantly enlisted by a floral emblem.

The choice of the State is divided between these three candidates so that to vote for other flowers does not seem to be called for, although no flower is out-lawed. Upwards of 15,000 votes have thus far been cast with a strong plurality of upwards of 5,000 in favor of the pine cone and tassel, but with a powerful sentiment for both the golden rod and the apple blossom. It may be well to say that by general consent the Mayflower has been reserved for Massachusetts. The ballot will be open until January 12.

It is not without significance that universal suffrage in Maine is first to be exercised in a question in which beauty and duty are co-ordinated. The national garland made up of flowers chosen by popular suffrage, will probably become a fact within two years. It may in due season supplant the wreath on our coins. It will re-inforce patriotism with the sentiment of beauty as the flag re-enforces national enthusiasm with its memories and its symbols.

Nor will the American Union lose on the side of higher sentiments if the states that compose it are typified by their characteristic flowers, those together composed as a national garland embodying both the individualism of state sentiment and the federation of patriotism.

It is earnestly requested that the members of the Pomological Society engage in the ballot of Maine's flower at this meeting, and it is hoped that an effort will be made to secure as large a vote as possible for Maine's flower, in the short time now remaining.

Miss Harriet Harmon of Foxcroft read the following poem written by Miss Julia H. May:

FOR COLUMBIA'S GARLAND.

They are weaving a beautiful garland
  To place on Columbia's brow,
The West and the South are weaving,
  And we must be weaving now—
A leaf, or a bud, or a flower—
  Ah! we need not look in vain.
Can the land give brighter blossoms
  Than those in the woods of Maine?

So many! O, how can we choose it?
  Shall it be the golden rod?
Shall we gather the apple blossom,
  Or the violets fresh from God?
Shall it be the star-eyed daisy?
  Shall it be the ripened grain,
That we pick for our mother's garland
  Out of the fields of Maine?

Shall we carry a bud, or a blossom,
  A branch or a tiny twig?—
They will need them all in the garland,
  They can use the smallest sprig—
Something pure and precious,
  That the rest would not obtain,
We must pick for our mother's garland
  Out of the woods of Maine.

Shall it be the opening rose-bud?
  Shall it be the fragrant pink?
They can bring more beautiful roses
  From the Sacramento's brink—
Shall it be the water-lily
  Whose petals the snow-flakes stain?—
There are lilies just as white and sweet
  As those in the lakes of Maine.

Fair is the star-eyed daisy,
  Queenly the golden-rod,
Sweet is the purple violet
  Peeping up from the sod,
And the royal buttercup
  Over the fields can reign,
But we want to carry something else
  Out of the woods of Maine.

We will go to the deepest forests,
  Where the brooks and the sparrows sing,
And a branch from the tallest tree-top
  Out of the shades we'll bring,
And we'll pick for our mother's garland
  A branch that is truly ours,
From a tree she gave us long ago,
  And will weave it among the flowers.

Mother of States and Nations!
  Mother of noble men!
Out of the pine-tree-forests
  We come to thee again.
Forest and happy island,
  River and singing sea,
Brooklet and bird and maiden
  Join in the jubilee.

We have given our sons and brothers
  In the days of bitter strife,
We have given our heart's best treasures
  For liberty's precious life,
They lie by many a hill-side,
  They sleep by many a plain,
And because they died we can send a gift
  Out of the woods of Maine.

Not to the sound of bugle,
  Not with the martial drum
Do we bring *this* gift, but with blessings,
  And with songs of peace we come,
Over the hills and valleys,
  Saved by the blood of the slain,
We bring our pledge of loyalty
  To thee, and the State of Maine.

Mother of States and Nations!
  We bring our native pine,
And we swear by the faith we owe thee,
  And the help of the hand divine,
Love that is strong and fervent,
  Love that is sweet and pure,
Growing, forever growing,
  As long as the pines endure.

DISCUSSION.

Dr. M. C. Fernald—I had no idea of opening this discussion in regard to the flower which should be selected in the State of Maine. There are some reasons why the pine is not a correct one to select, though that may sound a little strange to residents of "The Pine

Tree State." I had occasion in looking up the subject of forestry recently to obtain statistics in regard to the changes that are going on in the forests of Maine, and to take the changes on the Penobscot river for illustration :—I find in looking over the period of forty years, from 1853 to 1893, and contrasting the first five years of the period with the last five, the following changes in forest products:

I find that the spruce has increased from an average of 65,500,000 feet a year to 111,000,000 feet, or in other words the growth of the spruce has increased 70 per cent. I find that the annual production of the hemlock has increased from 12,000,000 to 24,000,000 in that period of time, or in other words, 100 per cent. And I find that the pine has fallen off from 69,000,000 to 24,000,000, or in other words, it has declined 65 per cent. That is to say, of the pine there is produced but 35 per cent of the same amount there was thirty years ago. The pine is running out, and unless recuperative methods are adopted, twenty-five years hence we shall not be known as the "Pine Tree State." Within a limited period of time the pine will not exist in the State unless some change is brought about. Now I state these facts so that we may vote understandingly. At the same time I am in favor of the pine as our State emblem. I think it should be adopted on historical grounds, but so far as present propriety is concerned we might as well call this State "Spruce Gum State" or "Spruce Tree State." I know it would take the poetry, or the sentiment, out of the idea, because there is a good sentiment that clusters around the pine, and I think it should be preserved. This State has been known through all its history as "Pine Tree State," and many of the leading citizens of the State have obtained their wealth from the pine; I believe it should be selected in preference to any of the flowers that have been named for the reasons that were presented in the paper. Notwithstanding this decline in the growth of the pine in our State I think it will be best to adopt this as the emblem and then prove true to the emblem. I believe if we allow this matter to drift for the next quarter of a century it will be almost impossible to restore the pine tree to the State of Maine; but commencing now it is possible, and we can be true to the name,—true to the motto. It seems to me that the pine is far more fitting for an emblem than any other that has been suggested. We have heard other flowers suggested, but they are in blossom but a short period of time; there is no flower or tree that would stand for so much in the State of Maine as would the stately pine that has been our boast and our glory in the past, and with proper treatment may still be in the future.

I suppose it would be out of order to discuss at all the subject of a national emblem. It is undoubtedly true that a garland will be adopted. If it were not adopted it seems to me that corn should be the national emblem. Ordinarily we have but little appreciation of the extent and value of this product. It leads all others.

SEC'Y McKEEN—The remarks of Dr. Fernald in relation to the pine as a fitting emblem for our State were extremely timely. I am aware that he has put much thought and care into this subject, but I hardly agree with him in one of the conclusions that he reached to-day,—that only by extreme care can Maine continue to be "Pine Tree State." It occurs to me that Maine is bound to be "Pine Tree State," that she cannot be anything else; that the pine is so thoroughly and completely indigenous to her soil that it must and will grow in spite of the woful and wasteful inroads of our Maine lumbermen and farmers. Twice in my memory have I assisted in cutting the pine growth from a piece of land for the purpose of pasturage, and to-day that piece of land is worth more than any other piece on our farm for the pine growth that covers it; and that is not an isolated case. Similar cases are occurring all over our State, and I believe that it is well that Mrs. Beedy has come here to-day to talk to us upon this question of the pine,—the pine tree as the floral emblem of our grand State. The first meeting of the Federation of Woman's Clubs was held in the office of the Board of Agriculture at the State House, and at that time a committee was formed for the purpose of designing a banner to be exhibited at the World's Fair that should carry with it as the emblem of the Federation of Woman's Clubs the purposes of that organization.

That banner is now hanging in that office; it consists of a cornucopia from which are floating in the shape of the three-leaved clover, the different women's clubs in our State, and from the corners of that emblem are hanging this same pine cone. The citizens of Maine as they visited the World's Fair and saw this emblem floating from the wall of the Maine Building were wonderfully struck with the appropriateness of the cone as an emblem of our State.

I think it is well for us all to grow up with the idea that the State of Maine is the place to live in, and just as many meetings as we can hold for the purpose that this meeting is held, and just as much as we can impress upon the minds of all, both old and young, the idea that we have something here worth living for, and that we are going to make emblematical for all time until it shall become a matter of history, just by that much shall we gain as a State and as a part of our nation. Within the memory of many of us is the time when Maine was considered a little too far north. My father used to remark when the cold nights of winter came that "The State of Maine is a little too far north." Very soon there came an idea into the minds of many that Maine was too far east, and then commenced an exodus to the West.—"Westward, ho!" was the watchward. But the idea is becoming apparent to all of us, old and young, farmer and mechanic, that the State is in just exactly the right place. We would not have it moved a degree South or West, but we are going to stay here and help develop it and make it worthy of having an emblem and a good one, in the great national garland that is to come.

Mr. Leland—I was somewhat struck with the conclusion at which Prof. Fernald arrived in regard to the forests of Maine, particularly the retrograde movement that is taking place in the growth of pine. It seems to me there may be some facts that he has not taken into consideration in regard to this matter. As I have passed through the southern portion of the State I have heard good, sensible men in that section make the remark that there was a larger area of pine in the southern half of the State than fifty or seventy-five years ago; not that there was a larger amount of timber, but of pine growth. We who are farmers in this county are aware of the fact that our pasture lands and lands not cultivated spring up readily to forest growth, and very much of that growth is pine. Of course we cut this pine where we wish to use this land as pasturage; at the same time there are acres and acres of this small growth that is coming forward very rapidly, as Secretary McKeen stated was the case on his farm.

Mr. Brown—The remarks of Mr. Leland bring to my mind something that has come under my personal observation in relation to the pine. Perhaps I have seen more of the pine growth of Piscataquis county than any man here. I have explored the forests along our lakes and rivers, and I claim to know something about the pine. I have seen thousands and tens of thousands of acres of our finest spruce, which is now being cut off and taken to the market more rapidly than the pine. If the destruction is going on with the spruce more than with the pine, the pine is very likely to survive the spruce.

In 1848 or 1849 I had occasion in passing from Augusta to this place to accompany a gentleman of very much greater age than myself, and a man of some distinction at that time in the county. I think it was in the town of Benton that we passed through a growth of young pine,—they were perhaps six or eight inches in diameter. When we came into that growth he said to me (he was a man who was reared in Fairfield) "When I was a boy this was a corn field, and the old corn hills can be seen here to-day."

We stopped and took some observations, and there were little hillets that looked like the old-fashioned corn hills. I did not have occasion to pass over that road again until 1864 or 1865 and then it was in the winter, and I found that the lumbermen were actually cutting off sizable logs for the saw mill to be manufactured into boards. I remember another instance some years prior, in 1843 or 1844, I was at ——— and there was a very fine growth of young pine standing on a point that made right into the lake. I know of a man who went upon that point and examined the trees, and came to the conclusion that there was not a tree there that was fit to cut for lumber. About 1860 I had occasion to visit the lake in the winter time and men were hauling off heavy lumber and driving it down the river to Old Town. Now, wherever this soil is adapted to pine, we shall find when that land is left to itself, the pine will spring up and mature. I have every reason to believe from the old pines that I used to meet with when in the woods, that pine is a natural growth of our soil, and when the pine shall cease to grow in Maine we shall no longer need a national garland.

Mrs. Beedy—Now I will sum up what I think to be the points in this discussion: We should select the pine as our floral emblem on account of its historical value. I think the children in every school room should be asked to describe our State seal. I wonder how many in this audience can tell exactly how many things are engraven upon it. If you should look at it you would see that the only thing on the background is the pine. It was the pine tree that made our State; it was the great giants and monarchs of the forest that attracted the King of England to this country. He sent out his emissaries to select them for his masts.

I was very much interested to sit at the feet of a gentleman almost ninety years of age, and have him tell me about those old pine trees, some of them ninety-two feet long. We do not know very much about those now, but our children ought to learn about them.

We should select the pine first, then, on account of its historic value; and secondly, we should select it for its beauty. As I came over the ground this morning and saw the pine in the forests I thought, riding through the State in the winter we cannot see the golden rod, but we can see the pine; it is perennial, always green; and so should our State emblem be. A few weeks ago I was confined to a sick room and a friend sent me some pinks with the pine; and I thought I never saw the beauty of the pine, as it was shown in combination with the pinks. And thirdly, we should make it our State emblem for the sentiment connected with it, if for nothing else. It is engraven in the hearts of our people. I found in looking over a paper a notice of a meeting of Maine people in Chicago, and it included a poem, from which I took this little extract:—

"To-night across my senses steals
The perfume of the pine;
O! sweeter far to homesick hearts
Then draughts of fragrant wine."

If any of you have ever been homesick out of the State of Maine, the thing you wanted to see was the pine, and the aroma you wanted to smell was the pine. The people of Ohio have for their emblem the Buckeye or Horse Chestnut, and they love that just as we love the pine. A few weeks ago they had a convention and a little poem was read,—I give you this snatch:

"O! the tasseled corn for the whole broad land,
For the Union no power shall sever;
But the Buckeye brown for the Buckeye State
Shall be our badge forever."

And I think that we in Maine can say:

"O! the tasseled corn for the whole broad land,
For the Union no power shall sever;
But the pine tree green for the 'Pine Tree State'
Shall be our badge forever."

Mr. Sampson, the principal of the academy here, very kindly consented to lend his co operation with reference to this meeting and to use his influence to have his pupils attend the meeting, and, for one, I feel very grateful that he did so. I am particularly gratified with a feature to which he has incidentally called by attention, which is this—while the pupils come here ostensibly as listeners they also come here as students, and one of the duties which the principal has seen fit to impose upon them is to prepare a report of the papers and the talk presented here at the present time. I suppose some of them are scribbling down what I am saying now, as they have what Secretary McKeen and the other speakers have been talking about; and in due time it will get into the academy and perhaps through them be handed down to future generations of pupils. What I wish to say is this,—I want to encourage just that kind of work, because if we can interest young men and young women, and boys and girls in this work of fruit growing and flower culture, or in anything that will cultivate a better taste and increase a knowledge of Maine and what grows in it, that work is in the right direction.

Through the courtesy of Mr. Sampson, the secretary received a very neatly prepared report of the afternoon session, and it gives him pleasure to publish so much of it as refers to National Floral Emblems:

Mrs. Beedy read an excellent paper prepared by Janet L. Dingley of Auburn. A short resume of the National Floral Emblems of countries across the Atlantic, opened the article—The shamrock of Ireland, the thistle of Scotland, the rose of England, the fleur de lis of France and the edelweiss of Switzerland, each by its manner of growth on events connected with its history, bringing dear and inspiring memories to minds of loyal citizens.

The first movement towards a United States Floral Emblem was made in the woman's congress at the World's Fair. Among other ideas advanced it was proposed that the emblem take the form of a garland composed of as many flowers as there are states in the Union, each chosen by the respective states. The ballot was opened November 4. Several states have already decided. Vermont will be represented by red clover; Iowa chooses Indian corn; California the poppy, and Wyoming the sunflower. What shall Maine choose? The paper did not commit itself but presented fairly the arguments in favor of the various flowers.

The apple blossom would make a fine appearance in the garland, but it withers and falls the day it is born and can hardly represent the enduring nature of our State. Golden rod is perhaps the most widespread of all Maine's flowers, but it is objected that the petals are so fine it would make an indistinct blur in the hands of the engraver. The grand old pine, however, has none of these faults. It is green and beautiful through summer and winter. It has an historic value also. The first flag that led American soldiers to battle showed upon its folds the figure of a pine tree. Our State has been known far and near as the Pine Tree State. We would do injustice to our history were anything else to represent us in our National garland.

After this a patriotic and touching poem by Miss May was well rendered by Miss Harriet Harmon of Foxcroft. Dr. M. C. Fernald, ex-president of Maine State College, said: "He grieved to notice that the pine tree is fast becoming a thing of the past in this State. The most wanton destruction is being practiced and if not checked, in twenty-five years the graceful pine once waving from every hill top will be seen no more in the forests of Maine. He gave us figures showing that as compared with hemlock, fir and spruce, the production of pine is fast decreasing. Let us vote for pine and then exert ourselves to preserve the pine." Numerous other remarks were made in favor of the pine. Mr. McKeen told us a side-splitting story and then eulogized the pine. He is a natural speaker and thoroughly woke up his listeners. The discussion was closed by a stirring appeal for the pine from Mrs. Beedy. Her graceful manner and pleasing voice fairly captivated the audience. Meanwhile a vote had been taken. The Mayflower received one vote, apple-blossom two, golden rod seven and the pine one hundred and fifty. Thus closed a session interesting and instructive alike to old and young.

STUDY OF PLANT LIFE.

By Supt. JOHN R. DUNTON, Rockland.

What are you?

A hundred and forty pounds, more or less, of bone and muscle, sensitive to heat and cold, whose needs are food, clothing and shelter.

Of course you are that, and in the next breath you say "my house," "my coat," "my body." Well what are *you*, if what I see is only yours? You do not know and I do not know, but we both do know that we live and think, and that in consequence of our thinking we enjoy or suffer or decide upon courses of action, and that our bodies do our bidding. Explain it as you may you are more than the weight that tips the scale beam, and you have capacities and needs beyond those of the horse you drive, or the dog that follows at your heels.

What are you doing? Thinking, aren't you? Thinking all the time. Perhaps beautiful thoughts, perhaps old and threadbare and distasteful ones; sometimes thinking thoughts that lead to action, sometimes thinking aimlessly—changing as often as the clock ticks and idly drifting on a sea of dreams,—but always thinking.

He who can interpret the messages they bring is educated. Education is not confined to books, nature forestalls the schoolmaster; the child begins his education in the cradle and he must continue it through youth and manhood and old age—who can say that he ends it at the grave? Then as becomes their high office as ministers to the soul that dwells within them, but while we are caring for the body and supplying the physical needs we should not neglect the self. Yes, man is more than a stomach; food for mind can not go in at the mouth, yet it must be fed or go through life starving and little and lean, and go forth naked when the time comes for it to leave the body it inhabits. It is well that we feed these bodies of ours and shelter them from the cold and clothe them.

EDUCATION IS NOT CONFINED TO THE SCHOOLS.

Every man of common sense is to a greater or less degree educated. If he puts his mind to his work and if he observes and thinks and adopts means to secure desired ends in consequence of his thinking he is developing his intellect and educating himself along the line of his occupation.

But the mind is worth too much to leave to the chance incidents of an occupation, especially in these days of minute division of labor where the man is only a pair of hands. But in our interest for the child are we not prone to forget that he is a child? We know that he was born ignorant. Do we forget that he has made the beginnings of all knowledge, even before he goes to school? Do we not expect our little David to slay his Goliaths in the armor of Saul? Why not give him his pebbles and sling?

Nature is the first source of all knowledge, even of that recorded in books. He is the child of nature and blood kin to his pets, plants and even to his mud pies, to feed a machine that does the thinking. And education is so important that youth can not be spent so profitably as in making a business of learning just as his body makes a business of growing; for no matter how fruitful the opportunities for mind culture in one's work, they will pass unnoticed or if noticed unappropriated if the worker does not know how to learn. And through knowing more of them he has come to know more of himself. Highlands, lowlands, air, water life and the artificial boundaries and industries of his neighbors, and their relations to each other typify the world. And through knowing these the world is his for the learning.

We were born to our environment ignorant. We were born with a capacity for knowing and enjoying all these things, but we are caged in a prison of bone, and walled in except at the gateway of the senses, through which must come the elements of all our knowledge and the same material of all our thoughts—brought to us by messengers of light and touch and sound.

Look out of the window! You see a landscape of hills, valleys and plains threaded by winding streams, and extending to the line of earth and sky. You see the wooded land and clearings, silent now and dreary but June will see them teeming with animal life and gay with flowers.

This is man's environment. All our lives long we are surrounded by the things out *there*. We are dependent upon them for all that we do and for all that we are, and all our lives long they are appealing to us through the senses.

Are they there simply to fatten our bodies that we may be better food for worms?

What is a man?

You asked me to talk on "plant study" and for fear that you might think I had lost the plant in nature I brought here the branch of a plant; a plant that is familiar to you all, so familiar indeed, that I can tell you nothing of it that you did not know before, and yet you are learning something new from it every year. These boys and girls know it; and perhaps they know that the Pomological society takes its name from the fruit of the tree to which this branch belongs.

Yes, it is an apple tree branch and it can tell the children many wonderful things of itself and its brothers and sisters at home, and best of all, if they cultivate its acquaintance, it will introduce them to hosts of interesting friends in the great plant family.

With your mind's eye look at the little apple tree you set out last spring and see if we can find worthy subjects for the child to study. You see it as a whole, but the tree like most living things, consists of parts and each part has its work to do and all of them depend upon each other. Its root hidden from sight reaches down into the soil reaching out and grasping with its woody fingers and holding on against the wind and other forces that try to tear it from earth. Every year it pushes itself farther and farther into the darkness and damp of the ground that its trunk may grow larger and its branches spread wider in the air and sunlight and bear leaves and flowers and fruit.

Root, trunk, branches, leaves, flowers and fruit, each is a whole that also consists of parts, and each part has its own characteristic qualities and uses; and each leads the child to new fields of observation and thought. Cut off the trunk and on the smoothed end of the section you have made you read a whole chapter of its life. At the center you see the white pith and around it the dark heart wood; next the rings of lighter sap wood and encircling all the green bark covered with its smooth brown skin. You know how it looks in the older tree, the pith no larger than this for it is dead and the heart wood darker and also dead, and the sap wood through whose little tubes passes the liquid food and drink to the baby buds and to the life cells that are building a new circle of wood under its jacket of bark. You and I know how this looked and felt on the sticks of the willow whistles we used to make and we know how it lasted in the "sliver" of the pine and we know how sick and pitiful the poor tree looked later in the summer, with its wounded body covered with pitchy blood and perhaps dying.

We know now that every ring by which we counted the age of the logs in the wood pile we did not love were once like the fleshy "sliver" of the pine and next to the bark. We know that year after year a layer is added, and that the little tree grows too big for its clothes. Year after year it stretches its bark and bursts it, but mends it before it is broken so that beneath the rough and outgrown outer bark there is a new and living layer to warm and protect it from the storms.

When we were boys we thought that the trunk stretches itself up and pushed its limbs up with it, but we have learned since then that a tree grows tall only at the top. The branching also is a subject full of interest to the child, and he can begin plant study with the apple tree at home if he chooses. The trunk divides and sub-divides and loses itself in big limbs and these divide still more and lose themselves in smaller branches and twigs. It is bare now and its naked branches rattle in the wind and ice clings to them; the tree is frozen in sleep, but spring will awaken it, and it will clothe itself again with leaves. Beautiful as the leaves are they were not born simply to ornament the tree, they are there to work and they do work. If the tree has thousands of mouths at its roots it has millions in its leaves and not only mouths but nostrils also and it eats and breathes for the tree. The blade of green, ribbed and veined and filled with pores is a laboratory also for transforming the air and sunlight into wood; and its stem and ribs and veins the canals through which it sends its products to the tree. Wonderful as it seems it is nevertheless true that the bulk of the wood comes through the leaves; so the boards and timber of our houses are largely made of air, and even an air castle may be a very substantial dwelling place, after all.

Now let us look at our branch again. A horse chestnut branch would be better, for you would see more plainly the scar left by each fallen leaf.

Beyond the scar you see a little bud which the leaf stem nurtured through the summer and which helped the leaf off to its rest on the ground when its work was finished in the fall; and then the bud began to take care of itself.

Most of the buds on our apple branch are long and tapering at the end but some are short and blunt, and if you watch them next spring as they swell and burst the horny scales that cover them, you will see flowers unfold from the blunt ones and branches and leaves from the slim ones; and you will find that the little bud at its bursting contains fully formed a telescoped branch, bearing its season's growth of leaves; and that the flower bud contains a whole cluster of apples.

So the spring and summer only mature the branches, leaves, flowers and fruit, that were born the year before.

Next June the air will be full of perfume from the orchards and we shall again enjoy the pink and white beauty of the tree-tops. A bouquet of apple blossoms is on our table and the child takes one in his hand, or if in his teens it may be that such things are beneath his notice, and only playthings for four-year-olds or nosegays for girls.

But you and I have grown older; we pity the poverty of his mind and think of "Peter Bell:"

> "A primrose by the river's brim,
> A yellow primrose was to him,
> And nothing more."

Shall it never be anything more? Shall not the school open his eyes to seeing, and his mind to knowing the beauty about his home?

You take the flower and you see the tinted petals and green sepals and the tuft of threads that stand on end in its center, and the yellow powder that trembles on their tops; and you think of the work it is doing in the orchard. While the yellow legged bees are buzzing back and forth from the hive, and the lazy butterflies are drinking nectar from the blossoms, the pollen grains drop down, and knock at the green doors below them; they go in, and then they awaken the tree babies asleep in their seed cradles, and feed them and start them growing.

That is what the blossoms are for, and not simply a holiday dress for the tree, and when their work is done, the yellow pollen, the thread-like stamens, and the beautiful petals of the corolla, say good-bye to the baby apples and float away on the wind. The tree has put on its every day wear of summer, but the little green sepals of the calyx always remain and you can see them dry and dead, opposite the stems of the apples you gather in the fall.

Cut the apple across and you see the star shaped cove and the brown seed within—full grown now, and dry and dead. Is it dead? Pull off its brown coat and separate the white inside along the line that passes lengthwise around it. At the pointed end we see a little speck, which under a lens takes form and our seed is not a seed, but a baby apple tree perfect in all its parts.

It was rocked to sleep by the wind that scattered the leaves but it is ready now to awaken in the earth, and send its roots down and trunk up, and to spread out into the sunlit air the little leaves that were born last summer in the darkened chamber at the apple's heart.

Under proper conditions this little germ would have repeated in itself the history of its parent and perhaps some day it would have sent its fruit to grace the exhibition tables of the society which bears its name. I have told you nothing new about the apple tree and I did not expect to. I wished simply to direct your minds to some of the interesting subjects for study that are presented to the child in the observation of even *one* plant; but if so much is written in one plant what an immensity of knowledge awaits the learning in all the plants that grow about his home. And why should not the school teach him to learn of the things that are always with him? And what I say of plant study is equally true of all nature study.

Plant study is not only adapted to supply the knowledge needs of the child but it is adequate for his mental development and the exercise of all his powers. It interests him, busies his hands and eyes, it cultivates the power of attention and observation and through the intelligent direction of these, it gives clear ideas for memory, imagination, judgment, reasoning and all the other faculties of the mind.

The material is easy to get and admirably adapted for collections. The knowledge that comes from it admits of systematic arrangement, it interprets the sense perceptions, and gives imagination the ideas for seeing the world beyond his vision. The clear ideas the child gets need names and so plant study increases his vocabulary, just as his oral expression cultivates his facility of speech and power of thought. He knows something and he wants to tell it, and the telling of it in writing affords the natural opportunity for teaching him the use of capitals, punctuation, sentences, paragraphs and all technical form of written language. He draws the leaf, or the fruit or the parts of the flower, and thus gains ideas of form as well as cultivates his power of expressing form. Plant study cultivates his power to get knowledge first hand, a power that he will need to use all his life, and it gives him ideas to interpret his seeing and the language used in books. He enjoys it while he is at school, it furnishes him with a pleasant pastime after school life is over; it brings him into sympathy with nature and into possession of an inheritance that does not perish with the using.

Day after day the farmer's boy has worked among plants—has he been learning to know them, and understand their language? Is his mind filled with knowledge in consequence of seeing them and does he love them and does his soul respond to their beauty with beautiful thoughts?

Alas, poor "Peter Bell!"

I was a farmer boy, and it has been the regret of my life that my opportunities for learning were lost because I had no teaching.

How commonplace it was! And what an education it might have been, and how full of beauty and sweet companionship it might have been then! And what memories to cheer amid the cares of later years I can only judge by the value I set on those I have and the feeling of my loss.

And I ask you who grew to manhood on the farm and have boys and girls at home, if they shall also miss the blessing that was denied their father? Or shall the school teach *them*, as it did not teach us? I hope so. They who dwell close to Nature's heart, may find tongues in trees, books in the running brook, sermons in stones and good in everything. And I have only touched upon its value as a helper in education.

But plants are only a third of nature and if the child is taught to observe and learn from all, what vistas of enduring pleasure are before him! And what fields of lifelong study are open especially to the country boys and girls.

One person sees more than another, not because his eyes are better, but because his mind is trained to interpret the impressions made upon the brain through the eye. What we see in things is determined by what we know of them. We may all look at the same things but no two will see the same thing for no two have the same interpreting knowledge.

We see with the mind, we do not see with the eyes, the eye is but the window, the eye can not be educated any more than the lens in your spectacles can be educated; eyes, ears and all the other organs of sense are but the instruments that the mind uses in learning. In learning what? In learning the color, size, form and properties of objects, primarily, but if that was all, our learning would be useless. It is not all, for every faculty of the mind stands ready to take what it can use of the materials brought in through the senses, and the name of this material is ideas. That *in* the mind which corresponds to the thing *outside* the mind and the word we apply to the thing is the sign of the idea.

Observation brings in ideas and thought places them side by side and compares them to find out their relations. *Clear* ideas are necessary to thinking and it is for the purpose of giving clearness to our ideas that observation needs to be trained. Observation deals with things and thinking deals with their relations. The mind compares one idea with another and forms a judgment as to the relation that the one bears to the other, and this judgment is expressed by a proposition.

The order of thought then is from the object of knowledge to the idea, from clear ideas to judgments of their relations; and from judgments that express known relations to conclusions establishing relations before unknown.

I have said nothing of memory, imagination and the other faculties of the soul, but they are equally dependent upon the elementary ideas that come through the senses. The grain must go in at the hopper or grist cannot come out of the spout.

The first steps in *any* study should furnish the elementary ideas from the *real* objects of thought and associate with them the terms used in books. Words are the symbols of ideas and only so far as men have like ideas and the same words to stand for them can they communicate their thoughts to each other by means of language. I would not detract from the value of books, and the study of books at school.

Books have their proper place in school and a very large place but they have usurped the place of observation and they have too long stood between the child and knowledge.

And you and I who know just enough of Nature to feel our *loss*, and to regret that we were not taught how to learn, know this too well. We think of our early possibilities and feel our need and go to books to learn—for our school taught us no other way—and when we look for Nature's units out of doors, we cannot find them. We do not see the trees for woods.

The earth beneath his feet is the child's. The heavens that arch over him are his and the sun by day and the stars by night shine for *him*. The land and water and life, the air that envelopes them and all the forces that act upon them or are manifested through them focus their rays upon him. He is the center of the universe as he is the center of the circle bounded by earth and sky. And this home slice was cut for him from the big round world, to feed his growing mind and bring him to the full stature of his knowledge. Shall he have it? Or shall others eat it for him and tell him how good it tastes?

If the child learns he must learn as all learners have learned, from Adam up. The history of the individual must be the concentrated history of the race.

GOOD FOOD FROM THE GARDEN.

By Miss Anna Barrows, Boston.

This subject does not belong directly to the work of the pomological society, but as we look at it we may see the connection. Probably the foods of primitive people were nuts or fruits already provided by nature and requiring little or no cooking. The earliest experiments in actual cooking were probably broiled meats; the cookery of fruits and vegetables indicates a higher degree of civilization. A criticism made by students of foods in other countries is that meat forms too large a proportion of the food of the American people; we have not yet learned how to cook and eat vegetables. All the efforts expended in horticulture and gardening are useless unless the fruits and vegetables produced are treated properly in the kitchen, therefore it is desirable that this society should consider the question of cookery.

Before we can cook vegetables intelligently we must understand their composition and to-night I have chosen a few that might be called typical vegetables. We will begin with the potato and I am sorry to say that in many houses the knowledge of vegetables apparently begins and ends with the potato, for we use it when we might better substitute other vegetables. It is a question whether we shall remove the skins before or after cooking. There is a loss of mineral substances and some of the solider portions which lie next the skin, but for many purposes it is a convenience to the cook to have the potatoes pared before they are boiled, and this is always desirable when the potatoes are imperfect. When we depend on the potato for nourishment we do well to cook it in its skin, but if we have other green vegetables like celery, lettuce or cabbage to give us the required mineral substances, what we lose in this way is often made up by the gain in the after preparation. Since these potatoes are pared and cut they must be covered with cold water to prevent them from turning dark until we are ready to cook them.

Next we shall use some carrots and to gain time in cooking and present them in the most attractive form on the table, they are to be cut in small portions. One reason why many of us do not like vegetables better is that we have been accustomed to having them cooked in only one way. The New England boiled dinner is good in its way, but this becomes unpalatable when it appears too often. We scrape the carrot since it has a thin skin, though a turnip should be pared because its skin is thick. This particular carrot has a ring of green on top which must be cut off, this is some of the green coloring of the plant which makes its appearance in the top of the root when not covered with earth and gives a strong bitter taste and therefore should be removed. I now cut the carrot in slices one way and then across the other lengthwise, and then turn it down on the side and cut across so that it falls apart in little tubes which cook quickly, are easily served, and make an attractive dish. Although we may lose some of the nutritive qualities of the carrot by cutting it in small portions, still if the water in which it is cooked is retained, all the goodness is there. It might be cooked in soup stock which should be allowed to evaporate at last leaving just enough to moisten slightly, and thus it would have a flavor of meat, or it might be served with a white sauce. A very pretty dish is obtained by sprinkling a little chopped parsley over the carrot after it is cooked.

Food often tastes better if it looks well, and if we wish to make these despised vegetables attractive we must put more care into their preparation. One reason for our dislike of vegetables has been our carelessness in this respect. A decayed portion, or a green place, or a root which might conceal earth not easily washed out will give a disagreeable flavor to a whole kettle full, and often the kettle itself is responsible for ill flavors.

Very few vegetables contain fat therefore we add butter or fat meat to them. When studying foods we are often astonished to find so large a percentage of water, and wonder that such articles have any real food value. We must remember that our bodies are about three-fourths water, therefore we require foods which are largely water. Many persons eat too much concentrated food and one of the great advantages of the more general use of fruits and vegetables is that in that way more water is taken into the system.

Tonight we cannot make any use of dried vegetables like peas, beans or lentils. Some experiments with them recently have shown me that if such vegetables are soaked for twenty-four hours or longer they will cook as quickly as when fresh, while if they are half soaked they require a long time for cooking. Tonight to illustrate the absorption of water by dried vegetable products, I shall use a manufactured substance, macaroni. It this country it is not as common a food as it should be, but it makes an agreeable change, is economical and nourishing. We have here about one-fourth of a pound or four cents worth. This has been cooked rapidly in boiling salted water until tender, then drained and covered with cold water which makes it firmer and in better shape for using afterward. I am using the macaroni to illustrate one use of tomatoes, from which a sauce is to be made to serve with it. Many times we want an extra dish on our table in a hurry when some supply has failed us. We can always have a package of macaroni and a can of tomatoes in the house and a substantial dish can be prepared quickly.

There is little danger in using canned foods if they are removed from the can as soon as it is opened. If only a half can of tomatoes is used and the remainder be put away in the can, the acid of the tomato acts upon the tin as is impossible when the can is tight. All canned foods are much better if well aired before serving. If fruit is turned into a shallow dish and left to stand for an hour or more before a meal it has a much fresher taste.

The tomatoes are rubbed through a strainer and are then suitable for a sauce or a soup. I melt one tablespoonful of butter, then stir in one tablespoonful of flour, one-half teaspoonful of salt and a little pepper. Cook till frothy and then add one cupful of strained tomato and cook until we have a smooth, thick sauce. If we wish to flavor this sauce with onion we can do it in several ways, we may cut it fine and cook in the butter, or cook it with the tomato before straining, or as I shall use it now by cutting a slice from the base of the onion and pressing the cut surface of the onion firmly against a grater over the sauce-pan containing the sauce, and several drops of onion juice will follow this pressure. In the same way in which this sauce is made we might make a soup by adding an equal quantity of meat broth or soup stock, and more seasoning. But now the tomato is added to the sauce and heated thoroughly. This is excellent to serve with cold meats.

Another dish suggested by this tomato sauce is a combination of rice and meat. Line a mold with a half-inch layer of cooked rice, fill with chopped meat (lamb or beef) mixed with a tomato sauce, cover the whole with more rice, and steam until well heated, then turn out of the mold and pour more of the sauce around it.

Some one has said that in the past the New England idea of vegetables included only potatoes, cabbage and turnip and beans and corn. I fancy that if we should go through this State taking a census of the varieties of vegetables used, we should find many families that seldom used any others. The Indians had about the same variety cultivated in this country before the white men came and it is surely time for us to make more progress in this direction.

There are many persons who have not learned to like asparagus because they have not found out how easy it is to cultivate. It is a valuable vegetable because it comes in a season when there are no other green foods, and an asparagus bed well started almost takes care of itself. Cauliflower, oyster plant, Brussels sprouts, egg plant and mushrooms are all delicious and yet not generally raised by farmers.

There is one substance in vegetables which is especially necessary for us to know about because it is so difficult to cook, and that is the cellulose or woody fibre. The amount varies in different vegetables and in the same vegetable at different stages of its growth. A beet, for example, is quickly cooked in midsummer, but later in the year will require several hours.

All of our vegetable foods can be served in a variety of ways, though there are but a few different methods of cooking them. In general we may say that vegetables are better if boiled rapidly, while meats are improved by stewing or slow cooking. The potato may be served whole, it may be mashed and made into croquettes or we may cut it up after cooking and heat it in a white sauce, or make it into a soup as we shall do to-night, or serve it cold with a dressing as a salad, and almost any other vegetable may be served in these and many other ways. Most of us would probably agree that if we could have the potato cooked in but one way that would be as a baked potato, but when we have potatoes too imperfect to bake we may boil them, mash them and make into soup or croquettes.

The summer vegetables are not available to-night and therefore I have said little about them. Many times peas, carrots and other vegetables having sweet juices are boiled in a large quantity of water and then a colander is placed over the sink, the vegetable turned in and the best flavor goes down the sink spout. With vegetables which have strong flavors like the onion and turnip it is well for us to use a large quantity of water and drain them in order to remove some of the overpowerful flavor, but in green corn, peas and squash we should retain as much of the sweetness as possible.

The onion is a wholesome vegetable and should be freely used. It is easy to peel onions if we keep them under water. If they are extremely strong the water should be changed once or twice while they are boiling. When we have onions left from dinner they may be cut up, mixed with a cream sauce, put in a shallow pudding dish and cover with a layer of buttered crumbs, then cook until the crust of crumbs is well done. Many people like onions in this way if not in any other fashion, and if we can by any means manage to make people eat more vegetables we are doing a good work. There are many dishes that we might prepare from vegetables that would give a desirable variety on our tables and make our daily bill of fare much better. It would be far better for us, especially in the summer season, if we ate less meat and hot bread and more vegetable foods. The potatoes which were pared at the beginning of this talk, have now been boiled until tender and are to be drained, mashed and made into a soup. For each cupful of mashed potato I shall use a generous pint of milk, as the potato is heavier than the milk a slight thickening of flour is needed to keep the two parts smoothly together. I use one tablespoonful of butter and a little less of flour, one-half teaspoonful of salt and the same quantity of celery salt and a speck of pepper, these are cooked together till frothy and then blended smoothly with the potato and milk and the whole strained. Last of all I add a few drops of onion juice and a little parsley. This is not fresh but dried parsley such as we may save from our gardens in summer. If too thick more milk or water should be added. In the same way soups can be made from almost any other vegetable.

Wilted vegetables are less palatable and usually require more time in cooking, but their condition can be improved by soaking in cold water. If we take a cabbage that has been stored for some time and cut off a slice from the stock and place it in a pan of water there will be a surprising change in the texture of the cabbage. Our next dish will be a cabbage salad. For this we may make a salad bowl from the cabbage itself, folding back the outer leaves then cutting out the center, chopping it and putting it back again into the leaves. This will give us an illustration of a vegetable which is suitable to eat uncooked, or as a salad. Olive oil is a wholesome form of fat especially suitable to serve with cold vegetables, but as many persons do not like that, to-night we will use a dressing where butter and milk supply fat.

BOILED SALAD DRESSING.

Melt one tablespoonful of butter in a saucepan, add one tablespoonful of flour, cook together till frothy but not browned, add one-half cupful of vinegar, and continue cooking till the mixture thickens; then remove from the stove. Thoroughly mix one teaspoonful each of salt, sugar and mustard and a few grains of cayenne, and sift into the vinegar sauce, stirring in smoothly. Heat one cupful of milk in a double boiler, add two beaten egg yolks, and cook like soft custard, stirring constantly. When slightly thickened remove the upper part of the double boiler and gradually mix the custard with the vinegar sauce. Beat the two parts together with the egg-beater until perfectly smooth, strain before it cools. Put away in small glass jars closely covered; it will keep for weeks in a cool place even if the jars are not air-tight.

This formula admits of many variations A whole egg may be used in place of egg yolks, but like any soft custard the dressing is smoother when yolks only are used. This is a particularly good way to turn to good account any yolks remaining after making angel cake or meringues, where whites alone are admissible. If there happens to be three or four yolks on hand instead of two, and it is not desirable to make a larger quantity of dressing, all may be used in this with no bad result. Chicken or veal stock can be substituted for milk. A thicker dressing may be made by using more flour or cornstarch in place of flour. For watery vegetables a thick dressing is desirable, and for others the sauce may be reduced by adding a spoonful of vinegar, or cream or stock to the portion to be used. The seasoning may be varied by changing the proportions given above, or by using vinegar already flavored with tarragon or garlic, or by the addition of celery salt, but it is usually best when making a large quantity of dressing to use only the ordinary seasonings and add special flavors on occasions. Celery salt, for example, would not be agreeable in all cases, but may be used for a chicken salad, especially when fresh celery cannot be obtained. The jar of dressing should be thoroughly stirred before using, as the butter, like any other fat, has a tendency to rise to the top.

SECRETARY'S PORTFOLIO.

The papers and other matter contained in the following pages happen to form no part of the transactions of the Society, yet are so related to the fruit interests of the State as to be entitled to the place assigned to them here.

SECRETARY'S PORTFOLIO.

AN ENTHUSIASTIC HORTICULTURIST.

Many fruit growers have been identified with the work of the Maine State Pomological Society in the past. Charles S. Pope of Manchester at the first meeting for organizing was chosen treasurer of the society, and from that time to the present he has been an able and faithful officer of the society. On the retirement of Robert H. Gardiner from the presidency, Mr. Pope was elected president in 1884 and year after year was re-elected until the present year. It was a remark of his at our Foxcroft meeting last winter that he had attended every public meeting of the society, and to this the writer may add that he was never an idle or indifferent listener on these occasions. In view of the valuable services rendered to the fruit growers of the State it is a pleasure to present our many readers with a brief sketch of Mr. Pope and an excellent portrait.

Only a few rods to the north of the "Forks of the Road" in the town of Manchester there is a stately rural home, surrounded by magnificent shade trees, and tastily adorned with beautiful shrubs and flowers. Nearly seventy-five years ago Mr. Pope's father settled upon this place when he was only nineteen years of age. The old Vassalboro home from which he came in later years became the property of Burleigh & Bodwell and was made famous among stockmen for its thoroughbreds. Four years after coming to Manchester he married Lavinia M. Stackpole of North Berwick. From this marriage there were four children, three daughters and a son. Many years of health and happiness were granted to both father and mother. During the past year the mother was stricken down with apoplexy and after months of helplessness death came to her relief. The father still lives to mourn his loss, while rejoicing in his own good health and pleasant surroundings.

The son was born September 3, 1841. He says he sought a wife among the fruit growers of New York, and married M. Elizabeth Carpenter of Ulster county. They have four children, three boys and one girl. The children have been trained to enjoy fruits and flowers, and with one accord as it were all seem to be natural fruit growers. We only wish some of our cold-hearted farmers could see what these children are doing for amusement and profit about their garden. The lesson would convince the most indifferent that children can find pleasure in doing these things. Guide them and encourage them and you bestow upon them more substantial wealth than hoarded dollars can give.

Before settling in Manchester, Mr. Pope's father had a nursery of apple trees in Vassalboro, and when he sold them he reserved some of the trees and brought them to his new home. The oldest trees on the hillside orchard came from this nursery, some 300 trees in all. When he was fourteen years of age the son planted a nursery of his own, and from this source the father and son began to set as soon as the trees were large enough, setting about one hundred trees a year for five or six years. Since then, additions have been made from year to year until the hillside is covered with trees. There are about 1,600 trees, covering not far from thirty acres of land. The orchard contains Baldwins very largely, though there are Gravensteins, Hubbardstons, Tompkins, Talman's Sweets, R. I. Greenings and Roxbury Russets. The Baldwin is the main crop, and under the skillful culture given to it, it has borne bountiful crops of choice fruit to reward its skillful owners. Exhibitors at our fairs have learned to respect the grower of this fruit, for it has been rare that fruit from this hillside has not borne away a large share of premiums. There are two things about this fruit, it shows a skillful grower and a skillful handlier, both of which are important in exhibition fruit.

Nor have his labors in fruit culture been limited to the orchard. He has a large, well arranged garden of small fruits—long rows, unobstructed by trees that are easily worked with the horse. An abundance of these luscious fruits have thus been grown for a large family, and the writer doubts if there is any family in the State that derives more substantial pleasure from the fruit garden than the Popes.

In recent years Mr. Pope has taken great interest in the culture of pears, plums and small fruits. His grounds contain twenty-two varieties of pears and twenty-six varieties of plums, Japan plums, apricots, peaches, quinces, etc. The vegetable garden is not neglected, for it is on a large scale both in extent and variety. He recently said in a letter to the writer: "It is fortunate I left the Society when I did, for if I attend many more meetings, I shall get to be so enthusiastic a grower of fruits and vegetables that I shall neglect everything else."

Mr. Pope and his father have long been manufacturers of granite wedges and half rounds for the use of quarrymen, but in the midst of business there has been found time for the care of the orchard and garden.

There are many traits in Mr. Pope's character that might be dwelt upon with profit in a sketch like this, but there is one trait to which the fruit growers of the State are indebted far more than we can express at this time. It is this, his willingness to impart information to others. His methods are good and many times he has told the fruit growers of the State the *how* and so far as possible the *why* of successful fruit culture. The public has always enjoyed listening to his addresses in fruit culture. Secretary McKeen of the Board of Agriculture, in response to requests for speakers on fruit growing has found him one of the most acceptable in the State.

While he has retired from official duties in our Society, it is the wish of many that we may still enjoy the pleasure of his presence and papers at our meetings. As fruit growers we may never be able to pay the debt we owe him, except in imitation of his willingness to impart to others of that which we have ourselves learned in fruit culture. "Freely ye have received, freely give."

JOHN JACOB THOMAS.

For nearly sixty years American fruit growers and farmers have enjoyed reading the words of Mr. John Jacob Thomas. So often has his name been associated with fruit growing that somehow none of us quite realized that his work on earth was so nearly completed. To be sure it was quite generally known that a few months before his death he was obliged to surrender his editorial labors to others, in consequence of weakness and nervous exhaustion. It was a great source of grief to him that his failing health necessitated his withdrawal from the work so much beloved. This surrender to approaching infirmities was in August last, and from this time on to his death there was a gradual breaking down until the end of life's journey was reached, February 22, 1895.

Mr. Thomas was born in 1810 on the shore of the beautiful lake, Cayuga, and for many years has lived at Union Springs, New York. He was the son of David Thomas, a man of culture and refinement, whose virtues were transmitted to his children. The father was an influential man—a student of nature, an explorer and surveyor. His children inherited his fondness for investigation and research.

Dr. Joseph Thomas, became famous as a writer in the editorial labors that gave the world the popular and valuable Gazetteer and Biographical Dictionary published by the Lippincotts. He also edited Thomas' Medical Dictionary, and wrote several educational books. He was a great linguist and an extensive traveller.

The subject of this sketch was perhaps less known to the world than the brother mentioned, but it is not for us to say that the life he lived was less useful. It was perhaps an uneventful life as compared with those of his father and brother. He was seriously handicapped in much of his work in consequence of delicate health and weakened vision, but he had the most indomitable resolution. More than this he had great natural gifts and a well developed mental organization with correct taste and artistic temperament. In his contribution to the press he drew his own illustrations, and in his books most of this work was done by himself. Not long since the writer's attention was called to a beautiful oil painting by Mr. Thomas, and by him presented to the former president of our society.

For many years Mr. Thomas was a regular contributor to *The Cultivator* and since 1853 associate editor of the *Country Gentleman.* The readers of this valuable paper, whose publishers have kindly furnished us with an excellent portrait, have been exceedingly fortunate. Much that is written on rural affairs is not worth the reading, but what came from the pen of Mr. Thomas was not only conscientiously prepared but could be depended upon as sound, both in theory and practice. His standpoint was that of a practical fruit grower and farmer. He knew what he was writing about as well as what he wrote for. The journalist, who has to write so much and so often, has far greater influence than many suppose. In these days men read, and more than anything else the reading forms the habits of the man and often shapes his whole career. The words penned by this conscientious student and observer in fruit culture have been found helpful to thousands.

> "'Tis so with thee—thy spirits gone abroad,
> And the glad earth teems with what thou hast done,
> And sons of toil with thee in accord—
> A thousand arms round out the plans which thine begun."

But Mr. Thomas did not limit his work to the periodical for there are two volumes prepared by him that have had a wide reading. These are the "American Fruit Culturist," and "Farm Implements and Machinery." The former of these has probably had a wider sale than any other work in fruit culture published in the United States, and we are glad to learn that a revised edition is now just published. Another work in nine volumes—Rural Affairs—was written by him in accordance with his own ideas. It has been found helpful in many ways and will be read and studied by the student of agriculture in years to come.

Although Mr. Thomas lived to a good old age, and enjoyed a particularly useful life, it is pleasant to think that his work is only begun and that the seed he sowed will spring up and bear still more abundantly in the years to come. The fruit growers of Maine join with others in paying grateful tribute to the memory of his useful life. May the many lessons he taught be long remembered, and may his quiet, untiring efforts to advance the interests of American pomology inspire us to similar work, while with grateful hearts we rejoice in the useful life of such a man as Mr. Thomas. He was the last of a trio, notable for their work in promoting fruit culture in America, Downing, Barry and Thomas. They are greatly missed in pomological circles, but their works live to enrich the lives of others.

THE RUSSETS.

Great confusion exists among fruit growers regarding the nomenclature of the russets. This confusion perhaps is no greater than it has been in the past, and the Secretary is convinced after considerable correspondence and investigation, that there is quite as much confusion in other states as there is in Maine. Of one point there can be little doubt, and that is regarding the American Golden Russet, for which in recent years the Society has offered premiums until the present year. The executive officers became convinced that very few of this variety were grown in the State and that several other russets were exhibited year after year under that name. Accordingly the premiums were withdrawn on American Golden Russets and in place of this, on account of the excellence of the Golden Russet a premium is offered on that variety and it is hoped in future judges may be able to go thus far with certainty. In answer to a recent letter Mr. Wm. A. Taylor, Assistant Pomologist of the United States Department of Agriculture writes:

"I regret that we can not furnish you cuts or accurate descriptions of the "russets." The subject has not been investigated here, and I am satisfied that the confusion is so great that a general examination and comparison of the fruit and trees of the different varieties will be necessary to settle several disputed points. The following varieties are well known and are quite generally conceded to be distinct and entitled to bear the names here used for them: Bullock—("*Bullock's Pippin*" of Coxe) ("*American Golden Russet*" of Downing. Golden Russet (of Western New York)—Barry. Golden Russet of Downing (*Russet Golden* of the earlier editions of Barry) (*English Golden* of Warder.) Roxbury (Roxbury Russet of Downing.) Pomme Grise *of Downing*. Concerning most of the other russets there is much uncertainty either in regard to the correctness of names or their distinctness as varieties."

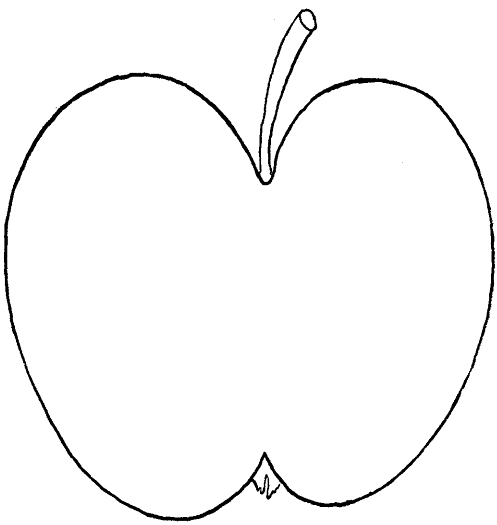
The object of this article is not to settle disputed points regarding the russets but to give as much information as possible to aid in the identification of varieties. Several times the same subject has been under consideration and ably discussed at meetings of the Society. Mr. R. H. Gardiner had an excellent paper upon the

"Nomenclature of Russets" (see Transactions for 1882) and this was followed by a paper by Dr. T. H. Hoskins. The writer questions very much whether any progress has been made since that time, in establishing the identity of the russets. It is hoped the following descriptions from several authors may be of service to Maine fruit growers.

AMERICAN GOLDEN RUSSET.

Synonyms Bullock's Pippin, &c.

This delicious table apple is a universal favorite with all who can appreciate delicacy of flavor and fineness of flesh in an apple, and yet it is not a profitable variety for orchard planting, because the fruit is very apt to be imperfect. The best I have seen were from the South and sandstone soils.



AMERICAN GOLDEN RUSSET.

Tree vigorous, upright, round-headed, small, foliage large, healthy. Fruit small to medium, roundish, conic, regular when perfect; surface smooth, yellow, covered with thin russet, sometimes faintly blushed; dots minute. Basin shallow, regular, eye small, closed. Cavity acute, regular, stem long, slender. Core medium, closed, meeting the eye; seeds numerous, pointed; flesh yellowish, very fine grained, tender, when fully ripe almost melting, like a pear, juicy, becoming dry when over-ripe. Flavor sub-acid, rich, aromatic. Quality very best. Use, dessert. Season, November and December.—From Warder's "American Pomology."

Under one of its synomyms Bullock's Pippin, Elliott, in "Western Fruit Book" thus describes the American Golden Russet:

Tree ultimately of only medium size, with a round, regular head, shoots erect, rather slender, admirably suited to rich soils of Southern Ohio, Indiana, the Southwest, &c. Grown South, the fruit is almost entirely covered with russet; North, in sandy soils it is a warm, rich yellow, with only marblings of russet. Size, small to medium; form, roundish ovate, tapering much toward the eye; color, generally rich golden yellow, overspread with soft russet, and in the sun, a marbling of red; stem, slender; cavity, narrow, regular; calyx, small, closed; basin, shallow, sometimes four rowed; flesh, yellowish, tender, juicy, almost buttery, delicate, sprightly; core, large for size of fruit; seeds, full, ovate, pyramidal. December to January, South.

Synonyms—Golden Russet, Sheep Nose, Bullock's Pippin, Little Pearmain.

The American Golden Russet is one of the most delicious and tender apples, its flesh resembling more in texture that of a buttery pear than that of an ordinary apple. It is widely cultivated at the West and in New England as the Golden Russet, and though neither handsome nor large, is still a universal favorite, from its great productiveness and admirable flavor. The uncouth name of Coxe, *Sheep Nose*, is nearly obsolete, except in New Jersey, and we therefore adopt the present one, to which it is well entitled. The tree is thrifty, with upright shoots, dull reddish grayish brown. Fruit below medium size, roundish-ovate, dull yellow, sprinkled with a very thin russet. Stalk rather long and slender, calyx closed, and set in a rather narrow basin. Flesh yellowish, very tender, juicy, with a mild, rich, spicy flavor; best October to January.—From Downing's "Fruits and Fruit Trees of America."

From these descriptions and the illustration it appears that the American Golden Russet is not grown to any extent in the State. Other varieties of russets have been erroneously called by this name.

GOLDEN RUSSET.

Synonyms—English Golden Russet, English Golden, Russet Golden. This is an old English apple described by Ronalds and Lindley as Golden Russet, and as that is its commonly accepted name in this country we have followed it. It is one of the popular apples, succeeding in nearly all sections and especially in rich western soils. The tree is thrifty, vigorous, spreading, rather irregular, forming a bushy head. Young shoots slender, dull reddish brown, slightly downy, with numerous small white dots. An early bearer.

Fruit medium or below, roundish, or roundish oblate; skin, rough; color, yellow, mostly covered with dull russet and having a bronzed cheek in the sun; stalk, short, small; cavity, medium or rather deep; calyx, closed; ligments, rather long, often a little recurved; basin, broad, rather large, slightly corrugated; flesh, whitish yellow, fine grained, rather compact, sprightly, mild, subacid. Good to very good. December to March.—Downing's "Fruits and Fruit Trees of America."

Fruit below the middle size, pretty regular in its outline, without angles, generally about two inches deep, and two inches and a quarter in diameter. Eye rather small, close, moderately depressed, surrounded by irregular plaits, part of which are more prominent than the rest; stalk very short, deeply inserted in an uneven narrow cavity, not protruding so far as the base; skin thick, of a pale copper color, yellowish russet, very thick and rough on the shaded side with a few patches, occasionally, of bright red on the sunny side and varicose at the base. Flesh pale yellow, very fine and crisp; juice not plentiful but saccharine, of an aromatic and slightly musky flavor.

A dessert apple from December till April.

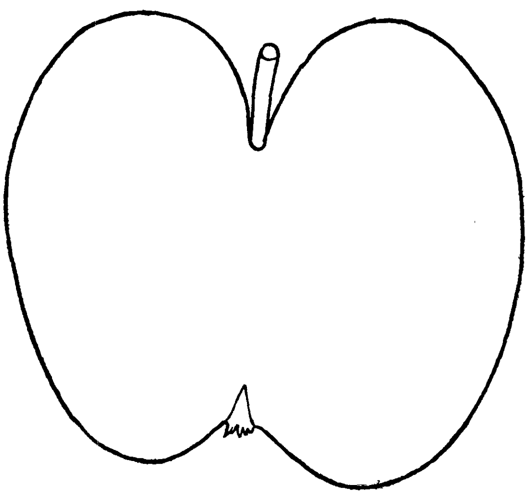
The Golden Russet has been known in our gardens ever since the time of Ray, who makes it synonymous with the Aromatic Russet. The trees are very hardy, living within bleak situations; they grow to a good size and are rather remarkable in having a profusion of slender pendulous branches.—"Guide to the Orchard and Fruit Garden" (1846) by George Lindley.

The origin of this apple is unknown; it appears to have been first cultivated in Essex county, Mass. The fruit is of medium size, round, rather oblong, and of a regular form; the skin is a smooth, yellow russet; flesh remarkably tender, spicy, and high flavored. The tree is very upright and handsome in its growth; bears abundantly; and is a valuable fruit, ripening in October, November, and December.—Printed in 1847 in "The New England Book of Fruits" by John M. Ives.

Downing says "there are many Golden Russets about the country, and it is difficult to identify them."

ENGLISH RUSSET.

The English Russet, sometimes called Poughkeepsie Russet has been frequently shown at our exhibitions; and Downing says the English Russet described by Warder is entirely distinct from the one he describes, being large, globular, flattened, somewhat one-sided, surface uneven, green. In season from December to January.



ENGLISH RUSSET.

On account of the confusion an exhibition of russets always makes it has been urged that the premiums offered for them in doubt should be entirely omitted. The executive officers, however, concluded that it would be more satisfactory to continue in a modified form, hoping sufficient knowledge may be gained before many years to enable fruit growers to identify them.

BOOKS FOR REFERENCE IN STUDYING VARIETIES OF THE APPLE.

In answer to a request for information upon the subject, Mr. Wm. A. Taylor, of the Agricultural Department, Washington, kindly made out the following list. Frequent inquiries are made for books upon these subjects and the list is published for the benefit of any who may wish to examine authorities.

Coxe, William, "A View of the Cultivation of Fruit Trees in the United States and of the Management of Orchards and Cider." Philadelphia, 8 vo., 1817.

Thatcher, James, M. D., "The American Orchardist," Boston. 12 mo., 1844

Manning, R., "The New England Fruit Book," 2d edition, Salem, Mass. 12 mo., 1844.

Kenrick, William, "The New American Orchardist," Boston. 12 mo., 1844.

Cole, S. W., "The American Fruit Book," Boston, 1849.

Hooper, E. J., "Hooper's Western Fruit Book," Cincinnati. 1857, pp. 333.

Warder, Dr. John A., "American Pomology," Cincinnati. 1867, pp. 744.

Elliott, F. R., "American Fruit Growers' Guide," Cleveland, Ohio. 186–.

Thomas, J. J., "The American Fruit Culturist," New York. 1875, pp. 576. [A new edition of this book was promised the present year and is probably in the market now.—D. H. K.]

Downing, A. J., (Revised by Charles Downing,) "Fruits and Fruit Trees of America," New York. 1892, pp. 1,011. With appendix, pp. 189.

Bailey, Prof. L. H., "Field Notes on Apple Culture," New York. 1886, 1890, 90 pp.

Barry, Patrick, "Barry's Fruit Garden." New edition, New York. 1891, pp. 516.

SCALE OF POINTS

For Use of Judges at Exhibitions.

As a basis for making up awards on our collective exhibits at the Fair, the executive committee have arranged the following scale of points: A catalogue has been prepared in which values are placed upon the varieties of fruit included in the society's premium list. The total of these points will make not more than one-half of the points of the exhibit. When the entry cards are prepared by the Secretary, the points belonging to each variety in the exhibit will be given to it, as for example, Baldwin, 41. The judges will take the list of varieties in the exhibit and score them. The footings of the two columns will determine the awards. Varieties not on our premium list are given a certain number of points. The purpose of this is to make it an object in these collections to show the best varieties of fruit, and the exhibitors who do this will receive full justice. The score of the varieties themselves will determine the points to which they are respectively entitled.

The tables are somewhat defective, the officers not being able to place correct ratings from their own knowledge. Before the exhibition ratings will be inserted from the most accurate knowledge to be obtained. Fruit growers who can supply the missing ratings are invited to send them to the Secretary for comparison.

EXPLANATION.

In the plan of rating, all varieties are supposed to be represented by perfect specimens: under each head the best varieties are rated at *ten*, and all the other more or less inferior varieties by some figure less than ten. It frequently happens that with the best varieties imperfect specimens find their way into the collections. The score following this list will provide a plan for rating the specimens exhibited. The "Total" in this table will be added to the score given the several varieties.

The ratings are more or less defective, but the committee feel confident that some such plan is necessary in order to do justice to the exhibitors. It is believed that experience will determine the defects, and future revisions may correct them.

APPLES.

VARIETIES.	QUALITY.		MARKET.		Productiveness.	Total ratings.
	Dessert.	Cooking.	Home.	Foreign.		
Alexander	4	8	9	0	8	29
Baldwin	6	8	8	10	9	41
Ben Davis	0	5	6	10	10	31
Deane	9	10	7	0	7	33
Duchess of Oldenburg	2	9	7	0	9	27
Fallawater	2	5	6	9	8	30
Fall Harvey	6	10	10	0	7	31
Fameuse	10	8	8	0	8	35
Garden Royal	10	8	8	0	7	33
Golden Russet	7	8	7	7	8	37
Granite Beauty	9	8	9	7	10	43
Gravenstein	10	10	10	0	8	38
Hubbardston Nonsuch	9	6	10	7	9	41
Jewett's Fine Red	10	6	9	0	7	32
King Sweeting	10	9	9	0	8	36
Large Yellow Bough	9	7	7	0	7	30
McIntosh Red	9	8	8	0	8	33
Milding	8	10	8	8	8	42
Mother	10	5	8	8	5	36
Munson Sweet	10	10	8	0	9	37
Northern Spy	10	10	10	10	7	47
Peck's Pleasant	9	9	8	10	5	41
Pomme Royale	10	10	10	0	5	35
Porter	9	9	7	0	9	34
Pound Sweet	8	9	8	0	8	33
Primate	9	8	7	0	8	32
Red Astrachan	5	9	8	0	8	30
Red Canada	9	8	8	8	5	38
Rolfe	8	9	9	0	8	34
R. I. Greening	8	10	9	9	8	44
Roxbury Russet	7	6	9	9	7	38
Russell	10	10	8	0	8	36
Somerset	9	7	8	0	5	29
Stark	3	6	6	9	8	32
Starkey	9	9	8	8	9	43
Talman's Sweet	8	10	10	8	8	44
Tompkin's King	9	9	10	10	5	43
Twenty Ounce	3	10	9	7	8	37
Wagener	10	10	8	0	7	35
Wealthy	6	9	7	0	8	30
William's Favorite	8	5	9	0	7	29
Winthrop Greening	9	9	6	0	7	31
Yellow Bellflower	9	10	10	5	9	43
Yellow Transparent	6	9	5	0	8	28
Any other correctly named variety	–	–	–	–	–	20

PEARS.

Varieties.	Quality.		Market.	Productiveness.	Total ratings.
	Dessert.	Cooking.			
Bartlett	10	10	10	8	38
Belle Lucrative	8	8	8	8	32
Beurre d'Anjou	9	8	8	8	33
Beurre Bosc	10	8	10	9	37
Beurre Clairgeau	5	5	7	9	19
Beurre Diel	8	5	7	10	30
Beurre Hardy	8	-	-	8	
Beurre Superfin	8	-	-	8	
Buffum	7	6	6	8	27
Clapp's Favorite	6	9	8	10	33
Doyenne Boussock	7	-	7		
Duchess d'Angouleme	8	9	8	10	35
Fulton	7				
Goodale	6				
Howell	8	6	9	9	32
Lawrence	9	7	9	10	35
Louise Bonne de Jersey	9	9	9	10	37
Marie Louise					
Nickerson	7	5	5	8	25
Seckel	10	8	10	10	38
Sheldon	10	10	10	6	36
Souvenir du Congres	7	8	6	9	33
Any other correctly named variety	-	-	-	-	18

PLUMS.

Bavay's Green Gage	7	10	10	10	37
Bradshaw	8	9	9	9	35
Coe's Golden Drop	6	7	8	7	28
Gage—Green (of Downing)	10	9	9	8	36
Gage—Prince's Imperial	9	9	10	9	37
Gage—Purple	7				
Gage—Red	7				
General Hand	8				
Guii	7				
Japan—Abundance	7				
Japan—Burbank	7				
Jefferson	9	9	8	9	35
Lombard	7	9	9	10	35
Magnum Bonum	6	8	9		
McLaughlin	10	10	10	7	37
Moore's Arctic	5	6	7	10	28
Penobscot	8				
Quackenbos	8	8	7	8	31
Smith's Orleans	8				
St. Lawrence	7				
Washington	10	10	10	6	36
Yellow Egg	6	10	9	7	32
Any other correctly named variety	-	-	-	-	18

SCALE OF POINTS.

The following scale of points, for determining the values of single varieties, is the one referred to in the preceding introduction.

In many cases it is desirable to have a reason for making awards, Believing that a scale of points would be of great service to judges in determining merit in doubtful cases, and at the same time of educational value to the exhibitor, the following scale has been adopted for the 1895 exhibition of single plates of apples and pears. In order to receive a first premium the fruit must score at least 75 points, a second premium 60 points, a third premium 50 points.

	No. of Points.	Score.
Quality	10	....
Form	15	....
Color	15	....
Size	20	....
Uniformity in size	20	....
Freedom from imperfections	20	....
Perfection]	100	....

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